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Proceedings of the American Academy of Arts and Sciences.

VOL. 51. NO. 14. — DECEMBER, 1916.

RECORDS OF MEETINGS, 1915–16.

OFFICERS AND COMMITTEES FOR 1916–17.

LIST OF THE FELLOWS AND FOREIGN HONORARY MEMBERS.

BIOGRAPHICAL NOTICES.

STATUTES AND STANDING VOTES.

RUMFORD PREMIUM.

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VOLUME 51.

1. THAXTER, ROLAND.— New Indo-Malayan Laboulbeniales. pp. 1–51. August, 1915. 70c.
2. BRIDGMAN, P. W.— Polymorphic Transformations of Solids under Pressure. pp. 53–124. September, 1915. $1.00.
3. WARREN, CHARLES H.— A Quantitative Study of Certain Perthitic Feldspars. pp. 125–154. October, 1915. 50c.
4. DALY, REGINALD A.— The Glacial-Control Theory of Coral Reefs. pp. 155–251. November, 1915. $1.25.
5. WHEELER, WILLIAM MORTON.— The Australian Honey-Ants of the Genus Leptomyrmex Mayr. November, 1915. pp. 253–286. 50c.
6. KOFOID, CHARLES ATWOOD, and SWEZY, OLIVE.— Mitosis and Multiple Fission in Trichomonad Flagellates. pp. 287–379. 8 pll. November, 1915. $1.50.
7. JACKSON, DUNHAM.— Expansion Problems with Irregular Boundary Conditions. pp. 381–417. November, 1915. 70c.
8. KENNELLY, A. E., and AFFEL, H. A.— The Mechanics of Telephone-Receiver Diaphragms, as Derived from their Motional-Impedance Circles. pp. 419–482. November, 1915. $1.25.
9 MAVOR, J. W.— On the Development of the Coral *Agaricia fragilis* Dana. pp. 483–511. 6 pll. December, 1915. 90c.
10. BLAKE, S. F.— (I) *Compositae* new and transferred, chiefly Mexican; (II) ROBINSON, B. L.— New, reclassified, or otherwise noteworthy Spermatophytes; (III) MACBRIDE, J. FRANCIS.— Certain *Borraginaceae* new or transferred. pp. 513–548. January, 1916. 50c.
11. MAVOR, JAMES W.— On the Life-History of Ceratomyxa acadiensis, a new species of Myxosporidia from the eastern coast of Canada. pp. 549–578. 3 pll. April, 1916. 70c.
12. BRIDGMAN, P. W.— Polymorphic Changes under Pressure of the Univalent Nitrates. pp. 579–625. April, 1916. 70c.
13. VERHOEFF, F. H., BELL, LOUIS, and WALKER, C. B.—The Pathological Effects of Radiant Energy upon the Eye. pp. 627–818. (8 pls.) July, 1916. $1.50.
14. Records of Meetings: Officers and Committees; List of Fellows and Foreign Honorary Members; Statutes and Standing Votes, etc. December, 1916. $1,00.

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(Title Page and Table of Contents.)

RECORDS OF MEETINGS.

One thousand and fiftieth Meeting.

OCTOBER 13, 1915.—STATED MEETING.

The Academy met at its House.

PRESIDENT WALCOTT in the Chair.

There were sixty-two Fellows present.

The following letters were presented by the Corresponding Secretary: from G. M. Allen, W. W. Atwood, Joseph Barrell, C. T. Brues, H. C. Bumpus, J. J. Carty, J. M. Clarke, W. D. Coolidge, R. H. Dana, L. E. Dickson, E. B. Drew, E. S. Drown, Alexander Forbes, G. S. Forbes, Philip Fox, F. L. Hitchcock, E. W. Hopkins, J. K. Hosmer, Ales Hrdlička, Reid Hunt, Wm. DeW. Hyde, C. N. Jackson, Dunham Jackson, C. A. Kraus, Kirsopp Lake, H. R. Lang, W. K. Lewis, W. C. Loring, E. G. Martin, S. E. Morison, Bernadotte Perrin, J. C. Phillips, J. W. Platner, L. W. Riddle, R. W. Sayles, Charles Schuchert, M. S. Sherrill, W. R. Thayer, A. W. Weysse, Bailey Willis, S. W. Williston, F. A. Woods, F. E. Wright, R. M. Yerkes, accepting Fellowship; from H. L. Clark, declining Fellowship; from C. J. de la Vallee Poussin, Norman Lockyer, Ernest Rutherford, Johan H. L. Vogt, accepting Foreign Honorary Membership; from James F. Norris, of Nashville, Tennessee, resigning from the Council.

The following deaths were announced by the Chair: William Robert Ware, Class III., Section 4; Andrew Howland Russell, Class I., Section 4; John Ulric Nef, Class I., Section 3; Ezra Ripley Thayer, Class III., Section I; Charles Hallet Wing, Class I., Section 3; Frederic Ward Putnam, Class III., Section 2 (elected Jan. 25, 1865) William Watson, Class I., Section 4 (elected Feb. 9,

1864, Recording Secretary since May 27, 1884); Ingram Bywater, Foreign Honorary Member in Class III., Section 2.

On motion of Professor Webster, a rising tribute was given in honor of Professor Watson's long and devoted service to the Academy.

The Corresponding Secretary announced the election by the Council of Dr. William Sturgis Bigelow as Recording Secretary for the unexpired term of the late Professor Watson, and of Mr. Arthur D. Little as a member of the Council for the unexpired term of Professor James F. Norris.

The President announced that Professor Trowbridge was appointed to represent the Academy at the inauguration of the President of the Johns Hopkins University, May 21, 1915.

On recommendation of the Council, it was

Voted, To appropriate the sum of two hundred fifty ($250) dollars from the income of the General Fund, for use of the Treasurer.

Announcement was made that the proposed amendments to the Statutes were referred to a committee, consisting of Elihu Thomson, Henry Lefavour and H. H. Edes.

The following paper was presented by title: "On the Structure of Finite Continuous Groups." By Dr. A. J. Bullard. Presented by Henry Taber.

Mr. John J. Carty, chief engineer, American Telephone and Telegraph Co., a newly elected Fellow, addressed the Academy informally on the recent remarkable progress in wireless telephony.

The meeting then adjourned.

One thousand and fifty-first Meeting.

NOVEMBER 10, 1915.— STATED MEETING.

The Academy met at its House.

The PRESIDENT in the Chair.

There were forty-six Fellows and six guests present.

The following letters were presented by the Corresponding Secretary: — from J. P. Baxter, T. J. Burrill, A. C. Lawson, S. W.

McCall, accepting Fellowship; from Alfred Craven, declining Fellowship.

The President announced the gift by Dr. Malcolm Storer, of six portraits of scientific men, P. C. Asbjornsen, R. W. Bunsen, Leopold Gmelin, Julius Adolph Stockhardt, Jeffries Wyman, and a group of members of the Math.-nat. Classe of the Kais. Akad. der Wissenschaften, Wien, the property of the late Dr. Francis H. Storer.

The following communication was given: Ideational Behavior of Monkeys and Apes. By Professor R. M. Yerkes.

Professor W. M. Davis showed three portraits of Darwin, in youth, in middle age and in old age, and three portraits of Dana, at the same periods of life.

Professor E. S. Morse also exhibited a portrait of Darwin as an old man, considered by his family as the best in existence, also an interesting portrait of Darwin's mother.

The meeting then adjourned.

One thousand and fifty-second Meeting.

DECEMBER 8, 1915.— STATED MEETING.

The Academy met at its House.

The PRESIDENT in the Chair.

There were twenty-six Fellows and two guests present.

The Librarian announced the acquisition of the late Professor Watson's scientific books, drawings and models and stated the conditions of the bequest, referring to its exceptional character and value.

The Corresponding Secretary announced the lapse of Fellowship of Mordecai Thomas Endicott and the transference of Samuel Eliot Morison from Class III., Section 4 to Class III., Section 3.

The following communication was presented.

"On the Microscopic Structure of Vegetable Organisms found in Coal," by Professor E. C. Jeffrey. A general discussion followed.

The meeting then adjourned.

One thousand and fifty-third Meeting.

JANUARY 12, 1916.— STATED MEETING.

The Academy met at its House.

The PRESIDENT in the Chair.

There were forty Fellows and two guests present.

A letter from Hugo Münsterberg, resigning Fellowship was presented by the Corresponding Secretary.

The Chair announced the following deaths: James Clark White, Fellow in Class II., Section 3; Sir Henry Enfield Roscoe, Foreign Honorary Member in Class I., Section 3.

The Corresponding Secretary announced the receipt of biographical memoirs of deceased Fellows, as follows: in Class I., Thomas Messinger Drown, John Morse Ordway; Charles Hallet Wing, by H. P. Talbot; Edward Stickney Wood, by J. C. Warren; in Class II., George Jarvis Brush, by C. H. Warren; Sir John Murray, by George Agassiz; Eduard Strasburger, by W. J. V. Osterhout; in Class III., James Barr Ames, by Samuel Williston; John Chipman Gray, by J. H. Beale; Daniel Coit Gilman, by C. R. Lanman; Bennett Hubbard Nash, by E. S. Sheldon; George Park Fisher, by J. H. Ropes; Henry Leland Chapman, by W. deW. Hyde; Horace Howard Furness, by W. A. Neilson; Augustus St. Gaudens, by D. C. French.

The following gentlemen were elected Fellows of the Academy:—

Class I., Section 2 (Physics): —

Emory Leon Chaffee, of Cambridge; Frederick Albert Saunders, of Poughkeepsie, N. Y.

Class II., Section 1 (Geology, Mineralogy and Physics of the Globe): —

George Hunt Barton, of Cambridge.

Class II., Section 2 (Botany): —

Bradley Moore Davis, of Philadelphia, Pa.

Class II., Section 3 (Zoölogy and Physiology): —

Thomas Barbour, of Boston.

Class III., Section 3 (Political Economy and History): —

John Bates Clark, of New York, N. Y.; Frank Johnson Goodnow, of Baltimore, Md.; John Osborne Sumner, of Boston.

The following gentleman was elected a Foreign Honorary Member: —

Class III., Section 3 (Political Economy and History): —

Alfred Marshall, of Cambridge, England.

The following communications were presented: —

Dr. Kirsopp Lake, "The Monks of Mt. Athos." Illustrated with lantern slides. Professor George F. Moore, "Mohammedan Law."

The following paper was presented by title: —

"On Cyclical Variations in Eruption at Kilauea." By Harry O. Wood, presented by T. A. Jaggar.

The meeting then adjourned.

One thousand and fifty-fourth Meeting.

FEBRUARY 9, 1916.— STATED MEETING.

The Academy met at its House.

The PRESIDENT in the Chair.

There were fifty-one Fellows and ten guests present.

Letters were presented: from E. L. Chaffee, F. A. Saunders, G. H. Barton, B. M. Davis, Thomas Barbour, J. B. Clark, F. J. Goodnow, and J. O. Sumner, accepting Fellowship.

The Corresponding Secretary announced the receipt of memoirs of deceased Fellows, as follows: in Class I.; Alfred Noble, by Desmond FitzGerald; Wolcott Gibbs, by T. W. Richards; Samuel William Johnson, by R. H. Chittenden; Sir George Howard Darwin and George William Hill by E. W. Brown; in Class II., Reginald Heber Fitz, by J. C. Warren; Cyrus Gurnsey Pringle, by B. L. Robinson; John Shaw Billings, by H. P. Walcott; Friedrich Daniel von Recklinghausen, by W. T. Councilman; in Class III., William Watson Goodwin and Samuel Henry Butcher, by H. W. Smyth; Abner Cheney Goodell, by A. McF. Davis; Frederic William Maitland and Henry Charles Lea, by C. H. Haskins; Ingram Bywater, by C. H. Moore; Francis Cabot Lowell, by A. L. Lowell; Thomas Day Seymour, by J. W. White.

The following death was announced by the Chair: Dr. Ludimar Hermann, Foreign Honorary Member in Class II., Section 3.

Communications were presented by Professor E. B. Wilson on "The Mechanics of the Motion of Aeroplanes"; by Professor A. G. Webster on "The Elementary Principles of Flight"; by Lieutenant J. C. Hunsaker on "The Experimental Determination of the Dynamical Properties of Aeroplanes"; by Mr. G. C. Loening on "The Construction of Aeroplanes"; by Lieutenant B. Q. Jones on "The Manoeuvring of Aeroplanes."

The meeting then adjourned.

One thousand and fifty-fifth Meeting.

MARCH 8, 1916.— STATED MEETING.

The Academy met at its House.

The PRESIDENT in the Chair.

There were twenty Fellows and four guests present.

A letter was presented from Mr. Alfred Marshall, accepting Foreign Honorary Membership.

The Corresponding Secretary announced the receipt of memoirs of deceased Fellows as follows: in Class I., Sir David Gill, Edward S. Holden, and George Davidson, by W. W. Campbell; John Ulric Nef, by J. O. Stieglitz; in Class II., Charles Sedgwick Minot, by W. T. Councilman; Ferdinand Freiherr von Richthofen, by R. A. Daly; Frederic Ward Putnam, by R. B. Dixon; John Henry Wright, by C. B. Gulick; Gaston Boissier, by E. K. Rand.

The Chair appointed the following Councillors to act as Nominating Committee: —

ARTHUR D. LITTLE, of Class I.,
GEORGE H. PARKER, of Class II.,
FRANK W. TAUSSIG, of Class III.

On recommendation of the Council, the following appropriations were made for the ensuing year: —

From the income of the General Fund, $5550, to be used as follows: —

for House expenses	$1600.
for Library expenses	1500.
for Books, periodicals and binding	1000.
for Meeting expenses	250.
for Treasurer's office	800.
for General expenses	400.

From the income of the Publication Fund, $3000. to be used for publication.

From the income of the Rumford Fund $2926.60 to be used as follows:

for Research	$1000.
for Books, periodicals and binding	200.
for Publication	600.
to be used at the discretion of the Committee	1126.60

From the Warren Fund $550. to be used at the discretion of the Committee.

An appropriation of $150. was made from the income of the General Fund for use of the Treasurer's office during the present year.

The following communication was given: "The Inheritance of Size in Guinea Pig Crosses," by Dr. William E. Castle. This was followed by a brief discussion.

The meeting then adjourned.

One thousand and fifty-sixth Meeting.

APRIL 12, 1916.— STATED MEETING.

The Academy met at its House.

The PRESIDENT in the Chair.

There were twenty-seven Fellows and one guest present.

A letter from Mr. Joseph Young Bergen, resigning Fellowship, was presented.

The Corresponding Secretary announced the receipt of two memoirs of deceased Fellows: Jean Baptiste Edouard Bornet, by W. G. Farlow; Charles Pickering Putnam, by J. J. Putnam.

The following deaths were announced by the Chair: Erasmus Darwin Leavitt, Class I., Section 4; James Burrill Angell, Class III., Section 4.

The following report of the Committee on the Amendments to the Statutes was presented: —

The Committee to which the several proposed Amendments to the Statutes were referred begs leave to report: —

Articles 2 and 3 of Chapter III, concerning Elections, are herewith submitted in a new draft, which substitutes the word "nominations" for "candidates"; provides that nominations shall be accompanied by statements of the qualifications of nominees and brief biographical data; that nomination papers shall be retained by the Corresponding Secretary until the first instead of the fifteenth of October or February; that the Fellows shall be notified not later than the fifteenth instead of the thirtieth of September and January that the time limit for making nominations will expire on the first instead of the fifteenth of the following month; and strikes out the provisions for reading nominations at the December and April meetings and posting them in the Hall. There are also a few, slight, verbal changes in no way affecting the provisions of the Chapter as they now stand.

Articles 3 and 4 of Chapter IV should be amended by striking out the requirement that the Recording Secretary shall send to the Fellows with any Independent Nominations for office which may be made, a list of the Regular Nominations, which have been previously mailed to them. There are also two slight verbal changes.

Article 2 of Chapter VI should be amended by striking out the requirement to post in the Hall a list of nominations to Fellowship; and specifically providing that the Report of the Nominating Committee shall be sent by the Recording Secretary to the Fellows at least three weeks before the Annual Meeting.

Article 5 of Chapter XI should be amended by striking out the reference to the present requirement that nominations to Fellowship shall be read to the Academy.

A draft of these six Articles as they will read if the recommendations of this Report are adopted is hereto annexed.

The Committee is unanimously of opinion that the proposed amendment to Article 1 of Chapter IV, providing that the President and Vice-Presidents shall not be elected for more than three years in succession, is inexpedient and should not be adopted.

Respectfully submitted,

ELIHU THOMSON.
HENRY LEFAVOUR.
HENRY H. EDES.

Boston, 12 April, 1916.

CHAPTER III.

ARTICLE 2. Nominations to Fellowship or Foreign Honorary Membership in any Section must be signed by two Fellows in that Section. These nominations shall be sent to the Corresponding Secretary, accompanied by statements of qualifications and brief biographical data, and shall be retained by him until the first of the following October or February, as the case may be. All nominations then in his hands shall be sent in printed form to every Fellow having the right to vote, with the names of the proposers in each case, and with a request to send to the Corresponding Secretary written comments on these names not later than the fifth of November or the fifth of March respectively.

All the nominations, with the comments thereon received up to the fifth of November or the fifth of March, shall be referred at once to the appropriate Class Committees, which shall report their decisions to the Council at a special meeting to be called to consider nominations not later than two days before the meeting of the Academy in December or April respectively.

Notice shall be sent to every Fellow having the right to vote, not later than the fifteenth of September or January of each year, calling attention to the fact that the limit of time for sending nominations to the Corresponding Secretary will expire on the first of the following month.

ARTICLE 3. Not later than the fourth Wednesday of December and April the Corresponding Secretary shall send in print to every Fellow having the right to vote all nominations that have been approved by the Council, with a brief account of each nominee.

See Chap. ii; chap. vi. art. 1; chap. ix. art. 1.

CHAPTER IV.

ARTICLE 3. At the Stated Meeting in March, the President shall appoint a Nominating Committee of three Fellows having the right to vote, one from each Class. This Committee shall prepare a list of nominees for the several offices to be filled, and for the Standing Committees, and file it with the Recording Secretary not later than four weeks before the Annual Meeting.

See Chap. vi. art. 2.

ARTICLE 4. Independent nominations for any office, if signed by at least twenty Fellows having the right to vote, and received by the Recording Secretary not less than ten days before the Annual Meeting, shall be inserted in the call therefor, and shall be mailed to all the Fellows having the right to vote.

See Chap. vi. art. 2.

CHAPTER VI.

ARTICLE 2 (Fifth Paragraph). After all elections, he shall insert in the Records the names of the Fellows by whom the successful nominees were proposed.

He shall send the Report of the Nominating Committee in print to every Fellow having the right to vote at least three weeks before the Annual Meeting.

See Chap. iv. art. 3.

CHAPTER XI.

ARTICLE 5. No Fellow shall introduce a guest at any meeting of the Academy until after the business has been transacted, and especially until after the result of the balloting upon nominations has been declared.

On motion of Mr. Leverett, it was

Voted, That the report of the Committee be accepted and the Amendments to the Statutes therein proposed be adopted.

The following communication was presented: "Bergson's Philosophy of Instinct as Viewed by an Entomologist." By Professor W. M. Wheeler. A general discussion followed.

The meeting then adjourned.

One thousand and fifty-seventh Meeting.

MAY 10, 1916.— ANNUAL MEETING.

The Academy met at its House.

The PRESIDENT in the Chair.

There were sixty-two Fellows and five guests present:

The Corresponding Secretary presented a letter from George Whitefield Chadwick, resigning Fellowship. The following bio-

graphical memoirs were also presented: Henry Williamson Haynes, by G. H. Chase; Henry Clifton Sorby, by J. E. Wolff; Israel Cook Russell, by A. C. Lane.

The death of Thomas Jonathan Burrill, Fellow in Class II., Section 2, was announced by the Chair.

The following report of the Council was presented: —

Since the last report of the Council there have been reported the deaths of eleven Fellows: — William Robert Ware, Andrew Howland Russell, John Ulric Nef, Ezra Ripley Thayer, Charles Hallett Wing, Frederic Ward Putnam, William Watson, James Clark White, Erasmus Darwin Leavitt, James Burrill Angell, Thomas Jonathan Burrill; and of three Foreign Honorary Members: — Ingram Bywater, Henry Enfield Roscoe, Ludimar Hermann.

Fifty-eight Fellows have been elected, of which number, two have declined Fellowship. One Fellow, elected in 1914, has not yet accepted. One Fellow, not accepting, has allowed his Fellowship to lapse.

Three Fellows: — Hugo Münsterberg, Joseph Young Bergen, George Whitefield Chadwick, have resigned Fellowship.

Seven Foreign Honorary Members have been elected, of which number, two have not yet accepted. Two previously elected, have not yet accepted.

The roll now includes 476 Fellows and 66 Foreign Honorary Members.

The annual report of the Treasurer was read, of which the following is an abstract: —

GENERAL FUND.

Receipts.

Balance, April 1, 1915	$1,001.19	
Investments	2,966.44	
Assessments	3,300.00	
Admissions	560.00	
Sundries	105.35	$7,932.98

Expenditures.

Expense of Library	$2,442.57	
Expense of House	1,575.79	
Expense of Meetings	260.98	
Treasurer	432.73	
Insurance	393.49	
General Expense of Society	251.58	
Interest on Bonds, bought	53.61	
Income transferred to principal	262.63	$5,673.38
Balance, April 1, 1916		2,259.60
		$7,932.98

RUMFORD FUND.

Receipts.

Balance, April 1, 1915	$3,334.48	
Investments	3,153.38	
Sale of Publications	3.75	
Interest on grant returned, 1915	81.25	$6,572.86

Expenditures.

Research	$2,370.00	
Books, periodicals and binding	135.89	
Publication	300.00	
Medals	454.00	
Sundries	13.25	
Income transferred to principal	153.16	$3,426.30
Balance, April 1, 1916		3,146.56
		$6,572.86

C. M. WARREN FUND.

Receipts.

Balance, April 1, 1915	$2,189.64	
Investments	1,138.44	$3,328.08

Expenditures.

Research	$383.50	
Vault rent, part	1.06	
Interest on Bonds, bought	11.38	
Income transferred to principal	1,029.91	$1,425.85
Balance, April 1, 1916		1,902.23
		$3,328.08

PUBLICATION FUND.

Receipts.

Balance, April 1, 1915	$1,670.04	
Appleton Fund investments	841.46	
Centennial Fund investments	2,369.26	
Author's Reprints	458.00	
Sale of Publications	163.40	$5,502.16

Expenditures.

Publications	$3,882.89	
Vault rent, part	4.17	
Income transferred to principal	158.15	$4,045.21
Balance, April 1, 1916		1,456.95
		$5,502.16

FRANCIS AMORY FUND.

Receipts.

Investments	$1,085.00	$1,085.00

Expenditures.

Interest on Bonds and Mortgage, bought	$243.80	
Sundries	6.25	
Income transferred to principal	834.95	$1,085.00

The following reports were also presented: —

Report of the Library Committee.

The Librarian begs to submit the following report: —

During the year, 65 books have been borrowed from the Library by 21 persons, including 14 Fellows and 1 library. All books taken out have been satisfactorily accounted for, except one taken out in April, 1914.

The number of bound volumes on the shelves at the time of the last report was 34,287. 394 volumes have been added during the past year, making the number now on the shelves, 34,681. This includes 49 purchased from the income of the General Fund, 15 from that of the Rumford Fund, and 330 received by gift or exchange. The pamphlets added during the year number 140.

The expenses charged to the Library during the financial year are: —

Salaries	$1,809.87
Binding: —	
General Fund	379.05
Rumford Fund	40.85
Purchase of periodicals and books: —	
General Fund	226.59
Rumford Fund	95.04
Miscellaneous	27.06
Total	$2,578.46

The scientific books of the late Professor Watson, the first choice of which he bequeathed to the Academy, have been received and deposited on the fourth floor. The Assistant Librarian intends to arrange and list them during the summer.

A. G. Webster, *Librarian.*

May 10, 1916.

Report of the Rumford Committee.

During the present year appropriations have been made in aid of research as follows:

Nov. 10, 1915. For the purchase of a calorimeter bridge of high precision, a galvanometer of high sensibility, and a calorimeter thermometer, to be loaned to Professor Farrington Daniels in aid of his researches on specific heats $330

For the purchase of a comparator to be loaned to Mr. Raymond T. Birge for his researches in spectroscopy 200

To Professor P. W. Bridgman in aid of his researches on thermal phenomena under high pressures (additional) . . . 400

To Professor A. L. Clark in aid of his researches on the physical properties of vapors in the neighborhood of the critical point. (Additional) 300

To Professor Gilbert N. Lewis in aid of his researches on free energy. (Additional) 300

January 12, 1916. To Professor H. M. Randall in aid of his researches on the infra-red spectrum, to defray the salary of an assistant 200

March 8, 1916. For the purchase of the comparator to be loaned to Mr. Birge. (Additional) 175

To Professor Louis V. King in aid of his research on the determination of the molecular constants of gases over the range of temperatures from 25° K to 1273° K 250

April 12, 1916. To Professor Frederick Palmer, Jr., in aid of his research on the properties of light of extremely short wave lengths 100

May 10, 1916. To Professor R. A. Millakan in aid of his researches on the photoelectric properties of metals in extreme vacua 500

On January 12, 1916, the Committee voted to appropriate from the Publication Fund the sum of $600 for the publication of two papers by Professor Bridgman on the thermal properties of substances under high pressures and $300 for the publication of a paper by Dr. Bell and Dr. Verhoeff on the effect of radiant energy upon the eye.

The Chairman having announced to the Committee that the set of replicas of the Rumford Medals from the beginning was now complete, it was voted to authorize him to make provisions for the display at the home of the Academy of these and such future replicas as shall be made.

It was also voted by the Committee in sequence to an earlier action upon the same matter to present to the Rumford Historical Society of Woburn a replica in bronze of the first medal awarded by the Academy to Dr. Robert Hare in 1839.

Reports of progress in their several researches have been received from the following persons: Messrs. C. G. Abbot, R. T. Birge, P. W. Bridgman, W. W. Campbell, A. L. Clark, D. F. Comstock, H. Crew, F. Daniels, E. B. Frost, H. C. Hayes, L. J. Henderson, (research finished), H. P. Hollnagel, N. A. Kent, F. G. Keyes (research finished), L. V. King, C. A. Kraus, A. B. Lamb, G. N. Lewis, R. S. Minor, E. L. Nichols, C. L. Norton, F. Palmer, Jr., J. A. Parkhurst, T. W. Richards, G. W. Ritchey, F. A. Saunders, W. O. Sawtelle, A. W. Smith, J. Stebbins, F. W. Very.

The following papers have been published in Volume 51 of the Proceedings of the Academy since the last annual meeting with aid from the Rumford Fund:

No. 2. "Polymorphic Transformations of Solids under Pressure," by P. W. Bridgman.

No. 12. "Polymorphic Changes under Pressure of the Univalent Nitrates," by P. W. Bridgman.

No. 13. "The Pathological Effects of Radiant Energy on the Eye" by F. H. Verhoeff, and L. Bell, with a systematic Review of the Literature by C. B. Walker.

CHARLES R. CROSS, *Chairman.*

May 10, 1916.

REPORT OF THE C. M. WARREN COMMITTEE.

The C. M. Warren Committee begs to submit the following report: The balance in the hands of the Committee at the time of its last report was $651.50. An additional appropriation of $800 was made at the meeting of May 12, 1915, and a further appropriation of $550 at the meeting in March, 1916. During the year a grant of $500 has been made to Professor James P. Norris for the study of factors which influence the valency of carbon, with the understanding that this sum may be used for the employment of a research assistant, who shall devote substantially all of his time to the research during the period for which payments are made from this grant. A grant of $300 has been made to Dr. Grinnell Jones for his work on the free energy of chemical reactions, with the understanding that a portion of it will be used for necessary apparatus and supplies, and a portion

for the payment of an assistant. The Committee also voted to appropriate sufficient money from the funds at its disposal to provide for the reprinting of two papers describing work done by Professor Mabery under grants from the Fund, namely Vol. 30, no. 1, and Vol. 31, no. 1. These are now out of print.

After deducting the amount of the appropriations to Professors Norris and Jones the Committee has at its disposal at the present time $1,201.50, from which must be further deducted the amount necessary to pay for the printing, probably in the vicinity of $30.

The question of the practicability of publishing a list of the current publications of the Academy in connection with the notices of meetings was raised with the Recording Secretary, and the suggestion has since been put into effect.

The work of Professor Harkins on the surface tension at the interface between two liquids has been completed, and the results are being published in the Journal of the American Chemical Society.

There is evidence that satisfactory progress is being made in other researches, and that other work will be published during the coming year.

Respectfully submitted,

H. P. TALBOT, *Chairman.*

May 10, 1916.

REPORT OF THE PUBLICATION COMMITTEE.

The Committee of Publication submits the following report for the period from April 1, 1915 to April 1, 1916.

During this period, 778 pages of the Proceedings have been issued, namely, Nos. 9–13 of Vol. 50 and Nos. 1–10 of Vol. 51.

One of these numbers (No. 2 of Vol. 51), costing $300 was paid for out of the funds of the Rumford Committee.

The accounts of the Committee of Publication up to April 1, 1916, stand as follows:

Balance on hand April 1, 1915	$1,670.04
Appropriation for 1915–1916	3,000.00
Proceeds from the sale of publications	163.40
Total available funds	4,833.44
Expenses (including an item of $32.52 for a running advertisement in "Science")	3,424.89
Balance on hand April 1, 1916	$1,408.55

It may be of interest to note that the size of the regular edition of the Proceedings is 1000 copies, including the 200 copies which are supplied to the author free of charge. For the convenience of authors, all orders for "extra" reprints (that is, reprints in excess of 200, chargeable to the author at cost) are now transmitted through the Committee. During the present year, authors have ordered such extra reprints to the amount of $458.00.

Respectfully submitted,

EDWARD V. HUNTINGTON, *Chairman.*

May 10, 1916.

REPORT OF THE HOUSE COMMITTEE.

The House Committee submits the following report for the year 1915–1916.

The Committee had at its disposal at the beginning of the year a balance of $306.12. The appropriation by the Academy for the year was $1600, and there has been received for the use of the rooms, from the Harvard Technology Chemical Club, $15, from the Colonial Society $15, making the total amount at the disposal of the Committee $1936.12.

The total expenditure for the year was $1,575.79, leaving at the close of the fiscal year an unexpended balance of $360.33. The expenditures may be summarized as follows: —

Janitor		$750.00
Electricity	A. Light	83.60
	B. Power	47.60
Gas		11.44
Water		8.00
Telephone		50.73
Coal	Furnace	343.00
	Water Heater	45.00
Wood		5.00
Ash tickets		14.00
Care of Elevator		30.80
Ice		14.40
Janitor's materials		14.06
Furnishings		55.66
Up-keep		100.50
Sundries		2.00
Total expenditure		$1,575.79

During the year the Academy has held eight meetings in the building. Other meetings have been held as follows: — The Boston Society of the Archaeological Institute of America, one; Massachusetts Board of Health, four; Harvard-Technology Chemical Club, five; Harvard Biblical Club, six; Colonial Society, four. There has been the usual use of the small rooms by the Council and Committees.

During the year the House Committee has been able not only to maintain the physical condition of the property of the Academy but to make a few changes which, it is hoped, will result in the greater comfort of the Fellows. New and more comfortable chairs have been purchased for use not only in the meeting room but in the reception room. Changes have been made in the position of a portion of the ventilating apparatus for the purpose of eliminating noise which has been most annoying in the past. Changes have been made also in the arrangement of the intake of air for ventilating purposes, which it is hoped will result in some economy in fuel.

The House Committee hopes that during the coming year means may be found whereby two improvements coming within their supervision may be carried out; one an improvement in the windows of the stack whereby the cold air and dust which is now a serious menace to our library may be eliminated and, second, a new lantern for the meeting room.

Experiments have been carried out during the year by Dr. Bigelow to find the best way of keeping the stack clean and at a proper temperature. He has had one window arranged in a manner which, it is believed, will remedy the present difficulties if it can be applied to all of the windows in the stack. The need of a good lantern is evident.

The Committee wishes to express its obligation to Mrs. Holden, the assistant Librarian, for her co-operation and assistance.

Respectfully submitted,

HAMMOND V. HAYES, *Chairman.*

May 10, 1916.

On motion of the Treasurer, it was

Voted, That the Annual Assessment be ten ($10) dollars.

The annual election resulted in the choice of the following officers and committees: —

HENRY P. WALCOTT, *President.*
ELIHU THOMSON, *Vice-President for Class I.*
WILLIAM M. DAVIS, *Vice-President for Class II.*

GEORGE F. MOORE, *Vice-President for Class III.*
HARRY W. TYLER, *Corresponding Secretary.*
WM. STURGIS BIGELOW, *Recording Secretary.*
HENRY H. EDES, *Treasurer.*
ARTHUR G. WEBSTER, *Librarian.*

Councillors for Four Years.

GREGORY P. BAXTER, of Class I.
WILLIAM M. WHEELER, of Class II.
ARCHIBALD C. COOLIDGE, of Class III.
To fill the unexpired term of W. S. Bigelow as Councillor till 1917,
MARK A. DEW. HOWE.

Finance Committee.

HENRY P. WALCOTT, JOHN TROWBRIDGE,
GEORGE V. LEVERETT.

Rumford Committee.

CHARLES R. CROSS, ELIHU THOMSON,
EDWARD C. PICKERING, LOUIS BELL,
ARTHUR G. WEBSTER, ARTHUR A. NOYES,
THEODORE LYMAN.

C. M. Warren Committee.

HENRY P. TALBOT, GREGORY P. BAXTER,
WALTER L. JENNINGS, ARTHUR A. NOYES,
CHARLES L. JACKSON, ARTHUR D. LITTLE,
WILLIAM H. WALKER.

Publication Committee.

EDWARD V. HUNTINGTON, of Class I.
WALTER B. CANNON, of Class II.
ALBERT A. HOWARD, of Class III.

Library Committee.

ARTHUR G. WEBSTER,
HARRY M. GOODWIN, of Class I.
SAMUEL HENSHAW, of Class II.
WILLIAM C. LANE, of Class III.

House Committee.

HAMMOND V. HAYES, LOUIS DERR,
WM. STURGIS BIGELOW.

Committee on Meetings.

THE PRESIDENT, THE RECORDING SECRETARY,
WILLIAM M. DAVIS EDWIN B. WILSON,
GEORGE F. MOORE.

Auditing Committee.

GEORGE R. AGASSIZ, JOHN E. THAYER.

The following gentlemen were elected Fellows of the Academy:—

Class II., Section 1 (Mathematics and Astronomy): —

Isaiah Bowman, of New York, N. Y.; William Bullock Clark, of Baltimore, Md.; Ellsworth Huntington, of Milton; Charles Kenneth Leith, of Madison, Wis.

Class II., Section 2 (Physics): —

William Albert Setchell, of Berkeley, Cal.; William Codman Sturgis, of Boston.

Class II., Section 3 (Zoölogy and Physiology): —

John Wallace Baird, of Worcester; John Lewis Bremer, of Boston; Frederic Thomas Lewis, of Waban; Percy Goldthwait Stiles, of Newtonville.

Class III., Section 2 (Philology and Archaeology): —

Louis Herbert Gray, of Boston;

Class III., Section 3 (Political Economy and History): —

Albert Bushnell Hart, of Cambridge.

Class III., Section 4 (Literature and the Fine Arts): —

Arthur Sherburne Hardy, of Woodstock, Conn.

The following gentleman was elected Foreign Honorary Member: —

Class III., Section 4 (Literature and the Fine Arts): —

Thomas Hardy, of Dorchester, England.

The following communications were presented: —

Professor George E. Hale, "Researches on the Nature of Sun-Spots."

Professor Percival Lowell, "Application of Improved Methods to the Photography of the Martian Canals."

The following paper was presented by title:

"New or Critical Species of Chitonomyces and Rickia." By Roland Thaxter.

The meeting then adjourned.

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JAMES BARR AMES (1846–1910)

Fellow in Class III, Section 1, 1876.

James Barr Ames was born in Boston, June 22, 1846. He was the son of Samuel Tarbell Ames, and Mary Hartwell (Barr) Ames. His grandfather, Jonathan Ames, was a farmer in Pepperell, Mass., whose paternal progenitor, Robert Ames, came to America about the year 1650. James Barr Ames's maternal grandfather, for whom he was named, James Barr, M.D. (Harvard 1817), was a physician of New Ipswich, N. H., whose father emigrated from Scotland in 1774. Samuel T. Ames, who was engaged in mercantile business in Boston, moved his residence in 1847 from that city to Medford, and there young Ames attended school until 1856, when the family returned to Boston. There Ames attended the Brimmer School until 1858, when he entered the Public Latin School, prepared for Harvard College. He entered College with the Class of 1867, but on account of ill health temporarily gave up his studies in his Sophomore year, and, when he returned to Cambridge a year later, joined the Class of 1868, with which he graduated. In college he made his mark in scholarship and was popular socially, but the distinction for which he was perhaps best known, at that time was gained as Captain of the Base Ball Nine.

After graduation he taught for a year in Dixwell's Private School in Boston, and thereafter during the next year travelled and studied in Europe. On his return in 1870 he entered the Harvard Law School. Professor Langdell had recently been made Dean of the School, and had introduced important changes in administration and in the methods of study,— particularly the Case Method of study and teaching. Ames became a devoted adherent of the new methods, and won distinction as a student, though during his course as a student in the Law School, he was also giving a large part of his time to teaching languages and history in Harvard College. The course of study in the Law School at that time was two years, but Ames remained for a year of graduate study, and immediately thereafter became Assistant Professor in the School. This appointment was a departure from all precedent. No one who had never practiced law had previously been appointed a professor of law in Harvard, or, indeed, in any American University. But the experiment proved successful, and has been repeated frequently with success both at Harvard and elsewhere.

From his appointment as an Assistant Professor in 1873, until his death, Ames devoted himself with rare singleness of purpose to the work of the Law School. He was appointed a full Professor in 1877, becoming Bussey professor in 1879 and succeeding Professor Langdell in 1903 in the Dane professorship. In 1895, he became Dean of the School, and so remained until his death in 1910.

Ames was a teacher of rare skill, and it is to him almost as much as to Langdell, that the success is due of the Case method of study, which has been adopted in all leading American Law Schools, and has influenced instruction in many other branches of study. His endeavor was by Socratic dialogue with his students to make them think for themselves after they had prepared their minds by reading selected cases. He became undoubtedly in the main the model for his younger colleagues, and, in a large measure, for teachers of law throughout the United States.

In connection with his work as a teacher, Ames prepared a number of volumes of Selected Cases on different branches of the law. These books have been used not only in his own School, but in many others. His permanent reputation as a scholar and law writer, however, will chiefly rest on a small number of essays published, from time to time, in legal periodicals and collected in a volume after his death. In these essays he showed great learning in the history of the law and remarkable capacity for constructive legal theory. His work on the early history of the Common Law won him reputation in Europe as well as America. On the questions involved in the origin and development of the Action of Assumpsit, his essays finally settled a problem which had puzzled scholars, and had never before been fully solved.

In recognition of his work the degree of Doctor of Laws was conferred on him successively by the Universities of New York, Wisconsin, Pennsylvania, Harvard and Cincinnati, by Northwestern and Harvard Universities, and by Williams College.

He was Chairman of the Section of Legal Education of the American Bar Association in 1904, and for some years a Commissioner of Massachusetts for the Promotion of Uniformity of State Laws. He lived to see his pupils Deans of ten of the leading law schools, and teachers in almost all of them; and every pupil carried into his teaching not only the method, but the ideas of his master.

He married, June 29, 1880, Sarah Russell, daughter of George Robert, and Sarah (Shaw) Russell, of Boston, who, with two sons, Robert Russell Ames, and Richard Ames, survived him. Throughout his service as a teacher, he lived in Cambridge during the School term,

and for many years spent his summers on a farm on the coast of Maine; first at York Harbor, and afterwards at Castine, where he combined study with the hard work upon his farm in which he delighted.

The influence which Ames acquired over his students and over the members of his own and of other Faculties, with whom he came in contact, was only in part due to his great learning. He was a man who combined the highest personal character with manners as charming as they were simple. He doubtless sacrificed the possibility of extensive writing, to discussion with his pupils, and to helping them in their needs of every kind, intellectual and personal. To many of them he will always remain the ideal scholar and gentleman.

In the Autumn of 1909, he suffered a slight cerebral hemorrhage which was followed by others more severe, and on January 8, 1910, he died at New Ipswich, N. H.[1]

SAMUEL WILLISTON.

JOHN SHAW BILLINGS (1838–1913)

Fellow in Class II, Section 4, 1881.

John Shaw Billings, elected an Associate Fellow of this Academy May 24, 1881, was born in Cotton township, Indiana, the 12th of April, 1838, and died in New York City, March 11, 1913. He was the son of James Billings of Saratoga, New York, and Abbie Shaw of Raynham, Mass. When he was about five years of age the family removed to Rhode Island and five years later went back to Indiana.

The narrow circumstances of the family did not permit the expenditure of much money upon the boy's education. His native ability and indomitable perseverance, however, procured for him a college education, and he was graduated with distinction at Miami University in 1857. Charles Elliott, Professor of Greek in that University, writing of him at this time, says that Billings was a young man of very superior talents and extensive acquirements and possessed of a great facility in communicating what he knew. This estimate was fully

1 The writer is indebted for much in this sketch to the Memoir prefixed to Professor Ames's collected Essays.

justified by the brilliant career of Billings. He obtained his medical education and received the degree of M. D. at the Medical College of Ohio in 1860. The outbreak of the Civil War found Billings Demonstrator of Anatomy in this College. He was appointed First Lieutenant and Assistant Surgeon in the United States Army in April, 1862, and throughout the war was actively employed in that department of the service.

He was married in 1862 to Miss Kate M. Stevens of Rochester, N. Y. and in December of 1864 was transferred to the Surgeon General's office in the War Department where he remained on active duty for the next thirty years and until relieved at his own request, on October 1st, 1895. His duties during this period were of the most varied character. Such only as could be performed by a man of the highest ability and almost unequalled capacity for work. Among his activities were the Report upon the Conditions of Barracks and Hospitals, 1870, Hygiene of the United States Army, 1875. In 1879 he was detailed as member of the National Board of Health, that most promising but ill-starred attempt at a central sanitary authority which, notwithstanding its character and noble contributions to science, was finally destroyed by the political activities of jealous rivals and for many years had no competent successor.

The examination of barracks and hospitals brought to his notice the defects in the ordinary systems of ventilation and heating and his book upon Ventilation and Heating was one of the results of this study, and the Johns Hopkins Hospital was another and even more important contribution. It is not too much to say that this group of buildings has been a model and the study for all establishments of this sort. The interest which Billings had in the construction of hospital buildings did not cease with the completion of this task. One of the last of his activities was his service as consultant in the designing of the Peter Bent Brigham Hospital in Boston. His knowledge of vital statistics was profound and his writings upon this fundamental branch of medical science are many, among the best in our own or any other language. His extensive and accurate reports upon the Medical and Vital Statistics of the United States and of the Census reports of 1880, 1890, 1900 and 1910 are achievements of especial importance.

He will perhaps be longer remembered for his service to medical literature than in any of his even greater activities. From the time of his assignment to the care of the Library of the Surgeon General's office he labored most strenuously not only for the increase of the

collection but also for a sufficient catalogue of its contents. Hence the Index Catalogue and later the Index Medicus which have been of the highest value to the student of medicine.

After a few years spent in the congenial labors of a Professor of Hygiene in the University of Pennsylvania he was persuaded to accept the responsibilities of the New York Public Library in the year 1895 and here were spent the remaining years of his life.

He was a frequent and welcome visitor in the medical circles of Europe and his addresses upon many subjects of professional interest were always received with eager attention. He held many distinctions, conferred by the universities and literary societies of this country and Europe.

The names of Dr. Billings and Dr. Weir Mitchell were, of all the physicians of their day in this country, probably the two best known in foreign lands.

H. P. WALCOTT.

GASTON BOISSIER (1823–1908)

Foreign Honorary Member in Class III, Section 4, 1904.

Gaston Boissier [2] was born in 1823 at Nîmes, in the Provence, a region almost as Roman, with its ancient remains, as Italy itself. Not unnaturally, the attention of the youthful Boissier was first turned to archaeology, which in its most significant aspect — the imaginative reconstruction of the past — was a dominant interest throughout his career. His earliest publications were on literary themes, but on such themes as involve a new creation of lost material; he discussed in his Latin dissertation for the doctorate, the manner in which Plautus translated Greek plays — plays no longer extant; he wrote on the poet Attius and the Roman tragedy of the republic — tragedy that has come down to us in scattered fragments; he essayed a task that has fascinated many — the reconstruction of the life and writings of the erudite Varro; he argued that Seneca's plays could not have been written for the stage. Of these works, the earliest appeared in 1857, and the latest in 1861; during part of this time, and before, he had been professor of rhetoric at Angoulême and Nîmes.

2 This sketch of Gaston Boissier is taken from the article published by the writer in the *New York Nation* for June 18, 1908, pp. 550f.

But Boissier was attracted by the actualities as well as the possibilities of antiquity. Appointed in 1861 to the chair of Latin eloquence at the Collège de France, he began appropriately with a course on the times of Cicero. In a brilliant lecture of introduction, he implies that the study of history means to him the study of personalities; Cicero and his friends are to furnish the clue to the movements of the age. To these personalities he devoted special essays, later to be combined into one of his most popular and delightful books. A passing reference to Saint-Simon and a comparison of Cicero and Mme. de Sévigné are prophetic, too, of further works to come; there is hardly a paragraph of the brief lecture which did not later develop into some fuller treatment. To Boissier's hearers, his theme, so eloquently presented, must have thrilled with an almost contemporary interest, for France had passed from an age of Republican revolution to one of Imperialism.

That a professor of Latin eloquence could interpret his subject broadly is shown by Boissier's appointment in 1865 as *maitre de conférences* at the École Normale to succeed Sainte-Beuve in the course on Latin poetry. Eleven years later he was elected to the French Academy in the place of M. Patin. In the interval there had appeared, besides his studies of Cicero and his friends, a noble group of essays, published in the *Revue des Deux Mondes*, which develop the various interests conspicuous at the beginning of his career. His archaeological tendencies now result in a discussion of the progress of archaeology and in a sketch of ancient life in Pompeii; based on sober fact, this brilliant portrait makes the pages of Bulwer and Sienkiewicz seem tawdry and dull. The publication of Le Blant's "Inscriptions chrétiennes de la Gaule" suggested an interpretation of this new material; the appearance of those important works, the "Histoire poétique de Charlemagne," by Gaston Paris, and "Les Épopées francaises," by Leon Gautier, inspired one of the most penetrating and universal of all his writings, an essay on recent theories of the epic. A series of papers treated of Roman society under the Empire, and there followed in 1874 a more profound study of the Roman spirit in the two volumes on "La Religion romaine," in which the treatment is by no means confined to religion, but includes among other things an appreciation of Virgil and of Seneca, quite as important for the literary criticism of these authors. Finally there had appeared a work which includes and supplements his earlier studies on Roman society, and is significant likewise for the history of philosophy and for literary history — "L'Opposition sous les

Césars." Varied interests, searching analysis, profound generalizations characterize these writings; they show the universal outlook, a spirit of placid Horatian urbanity, a sprightly wit. Their author was justly selected as successor to Patin and Sainte-Beuve.

Two of these essays, not so much before the public to-day as Boissier's larger works, give more definite expression than these do to those ultimate principles which guided him as author and as critic. The essay on the progress of archaeology and that on the theory of epic are really documents of literary criticism; they present different aspects of the same problem and hold an important relation to ideas current at that time and at this. The first gives small comfort to those who regard a proper contempt for science as a part of the humanist's outfit. Boissier is intensely interested not only in the great scientific advances of the last century, but in the minutiae of philology, which he regards as material for the enrichment of appreciation. He did not indulge in easy vituperation of whatever goes on *au-dela du Rhin;* it is not as a jest that he tells of Ritschl's course on Latin grammar which finished part of the alphabet — it is to commend the intellectual curiosity of the two hundred students who attended such a course. In brief, he criticises French scholarship for its lack of minute analysis; he prophesies for it a great career, in case French clarity assimilate German science — a prophecy which his inspiration has helped largely to fulfil. For him, Latin eloquence and Classical philology are, it would seem, synonymous terms.

Of further honors bestowed on Boissier, it is necessary to mention only his election to the Académie des Inscriptions in 1886, and his appointment as perpetual secretary of the Académie Française in 1895; the American Academy of Arts and Sciences added his name to its roll of Honorary Members in 1904. As to his writings, one could almost predict, from what he had done, the volumes on Mme. de Sevigné (1888), and Saint-Simon (1892). Archaeology appears again — and more than archaeology — in his "Promenades" through Rome and Pompeii and the country of Horace and Virgil, and in his "L'Afrique romaine" (1895). His interest in both Roman religion and the origins of Christianity finds expression in the splendid volumes on "La Fin du paganisme" (1891), which have inspired admirable works by French scholars in the same field. Finally, he published a volume on Tacitus (1903), and on "La Conjuration de Catilina" (1905), works of unusual importance both for the student of antiquity and for the modern historian. It is interesting that, in his last book, he should return to the subject with which he began his course on *l'éloquence latine.*

There are, then, two distinct classes in Boissier's works, one archaeological in spirit, devoted to the reconstruction of what no longer exists; one interpretative, devoted to accessible records. There is no absolute cleavage between the two. His reconstructions proceed carefully on the basis of the known. His interpretations do not end with what is before us; they reconstruct personalities and ideals — Cicero and his friends, Tacitus and the method of the ancient historian. Both undertakings are of the highest order. They depend on a quality without which Classical studies or any other studies are dead — the creative imagination. Boissier modestly said of his Catiline that it contained nothing new; the elements in it are not new, but they are transformed, as by some chemical change, into a new substance, a work of art.

E. K. Rand.

JEAN BAPTISTE EDOUARD BORNET (1828–1911)

Foreign Honorary Member in Class II, Section 2, 1893.

Jean Baptiste Edouard Bornet, born at Guérigny, Nièvre, France on September 2, 1828, was the son of Pierre François and Elizabeth Justine (Réveillé) Bornet. He became interested in botany in early life and was specially influenced by his work with the distinguished mycologist, Léveillé, while pursuing his medical studies in Paris. He obtained his degree in medicine in 1855. Shortly before that date he became acquainted with Gustave Thuret, a wealthy amateur, interested in the study of marine algae whom he assisted in his work at first in Cherbourg. Thuret in consequence of feeble health was obliged later to reside on the shores of the Mediterranean and in 1857 he purchased at Antibes near Nice an estate where he was joined by Bornet who acted in the double capacity of physician and co-worker in botany. The garden at Antibes soon became known as the finest private botanical garden in Europe and there Bornet remained until the death of Thuret in 1875.

The garden was then purchased by Mme. Henri Thuret who desired that Bornet should remain in charge of it but feeling it to be his duty to prepare for publication the results of the algological work of Thuret and himself, he declined the offer and removed to Paris where he

remained until his death, December 18, 1911. The garden was presented to the French government for a scientific station.

Bornet's scientific reputation rests mainly on his work on algae and lichens. He was a skilful artist and a writer whose style was remarkable for its clearness and elegance as is shown by the now classical works, Etudes Phycologiques, 1878, and Notes Algologiques, 1876–1880. In the Recherches sui la Fécondation des Floridées, 1867, the sexuality of the red seaweeds was first demonstrated. In the works above named Bornet and Thuret had worked in collaboration. Bornet also published a number of important papers on algae including several on Nostochineae. His most important work on lichens was Recherches sur les Gonidies des Lichens, 1873, an important contribution in support of the algo-fungal nature of lichens. While living at Antibes he became interested in the question of hybridization as illustrated by the native species of Cistus. His notes on this subject were edited by Gard and issued posthumously.

Bornet was elected a member of the Académie des Sciences in 1886, and he was an honorary member of many foreign societies. He was a person of great modesty, possessed of wide information on many subjects, and in conversation very witty and sprightly. For many years his house on the Quai de la Tournelle, opposite Notre Dame, was the resort of botanists from all parts of the world.

W. G. Farlow.

GEORGE JARVIS BRUSH (1831–1912)

Fellow in Class II, Section 1, 1871.

George Jarvis Brush, the distinguished mineralogist and educator, was born in Brooklyn, New York, on December 15th, 1831. He was the seventh in line of descent from Thomas Brush, one of the early settlers of Long Island. The father of Mr. Brush was Jarvis Brush, and his mother, Sarah Keeler; the father was a successful commission and importing merchant. He retired from active business while still a young man, having accumulated a sufficient fortune, and at the same time (1835) moved his family to Danbury, Connecticut, where they lived until 1841. He then returned to Brooklyn.

His son's early education was received in private schools. When fifteen, he was sent to the school of Mr. Theodore S. Gold in West Cornwall, Connecticut. Although he remained here for only six months, the period appears to have had a strong influence on his subsequent career. Mr. Gold was an inspiring teacher and an enthusiastic naturalist, being especially interested in mineralogy, and aroused in young Brush an interest in this subject, which was to bear rich fruit after years.

It was intended that the boy should follow in the footsteps of his father and become a business man. Accordingly he next took a position in a mercantile house in Maiden Lane, New York City, where he remained for about two years. A serious illness made it advisable that he give up the close confinement of the mercantile life and it was decided that he should become a farmer. This led to his coming to New Haven to attend the lectures of Professors John P. Norton, and Benjamin Silliman, Jr., in Agricultural and Practical Chemistry at Yale College. His name appears in the college catalogue for 1848, as a member of the second class in the "School of Applied Chemistry." In 1852, he went to Louisville, Kentucky, as assistant to Professor Benjamin Silliman, who was instructor in Chemistry and Toxicology in the Medical Department of Louisville University. He remained there until the spring of 1852. During this period, in the spring and summer of 1851, he travelled in Europe in a party headed by the elder Professor Silliman. In 1852 he was granted a special examination at Yale College, made necessary by his absence, and at the commencement of that year, he was given the newly established degree of Ph.B. He was thus a member of the first class graduated from the Scientific Department of that Institution; a department that he was destined to afterwards develop into the Sheffield Scientific School. It is worthy of note that this first class of fourteen members four afterwards became prominent in Science.

He spent the next college year, 1852–1853, as assistant in Chemistry to Professor J. Lawrence Smith. Here he made the acquaintance of William Barton Rogers, who was then teaching there. It is suggestive that these two men, who were later to direct two of our great scientific schools, were thus thrown together at an early period of their lives. It was while he was at the University of Virginia that, in association with Professor Smith, he published his first mineralogical papers, entitled, "A Re-examination of American Minerals." This work showed at once his ability as a scientific investigator and his interest in mineralogy. It also led him to feel the necessity of further scientific

training and study, and accordingly in November of 1853 he sailed for Germany. Here he spent the years 1854 and 1855, first at Munich studying with Leibig, von Kobell, and Pettenhofer, and later at the Mining School at Frieberg, Saxony. In 1855 he was elected Professor of Metallurgy in the Sheffield Scientific School of Yale and in order to fit himself more fully for this position he spent another year abroad studying at the Royal School of Mines in London, and visiting the principal mines and smelting works in Great Britain, and on the continent. He entered upon his duties at Yale in January, 1857. In 1864 his chair was broadened to include mineralogy, and later, in 1871, it was finally limited to the latter subject.

He long acted as secretary and treasurer of the Scientific School, and in 1872 he was made its director and served in this capacity until 1898, or through a period of twenty-four years. Although at this time he resigned his active administrative duties he continued to serve as treasurer and secretary to the board of trustees until 1900, when he gave up the duties of secretary, becoming President of the Board. He gave up the treasurership in 1904, but remained president until the end, presiding at the Annual Meeting in November, 1911. After a brief period of failing health, owing to a heart trouble, which first appeared in the spring of 1911, he passed quietly away on February 6th, 1912.

In 1864 he was married to Harriet Silliman Trumbull, who died in 1910. Three daughters were born to them.

As a scientist Professor Brush's name is closely associated with mineralogy. He showed a keen interest in this subject even as a boy when he collected minerals with Mr. Gold, and it was always the branch of science that interested him most. He was among the first in this country to apply refined methods of chemical analyses to the study of minerals, and his work was the fore-runner of the great amount of skilful and valuable work later carried on in the Sheffield laboratory by Brush's distinguished colleague and successor as Professor of Mineralogy, S. L. Penfield. The results of his researches made a lasting impression on the development of mineralogical science, and the effects of his teaching were carried by his many students throughout the land. Besides numerous papers relating to separate minerals and to mineral localities, he published in 1874 a "Manual of Determinative Mineralogy" patterned after the German tables of von Kobell. A later edition appeared in 1878. This book was later enlarged and extended by Professor Penfield, and under the joint names of Brush & Penfield is today the great standard work on de-

terminative mineralogy. He made many contributions to the System of Mineralogy by James D. Dana. Of the ten supplements to the fourth edition he prepared the eighth, ninth and tenth. He rendered most important assistance to Professor Dana in the preparation of the fifth edition of this great work, and the first appendix to the last edition was written by him.

He was also associate editor of the American Journal of Science from 1863 to 1879.

The mineral collection which was gotten together by Professor Brush during his long life is one of the most representative and best known collections in the world. It was finally given by him to the Sheffield Scientific School with an endowment for its upkeep and extension.

Although widely known as a mineralogist, and as a successful teacher, his greatest services to mankind were rendered in connection with his directorship of the Sheffield Scientific School, whose development may quite properly be called his life work. Professor Brush is to be counted among the small number of men who foresaw with an almost prophetic vision the great importance which scientific training, a side of education to which little enough attention was paid at the time when he was a young man, must have in the development of the country's industrial growth. He graduated from Yale at a time when science was little esteemed, particularly in its relations to everyday affairs. Education was largely along classical lines. He resumed his connection with the scientific department of Yale when it was still a very small and weak affair. It needed wise nursing and financial help. He was a great addition to its small group of able and self-sacrificing teachers, bringing to it, as he did, not only his native ability as a teacher, his personal enthusiasm, but also the exceptional training and experiences he had acquired in Europe. He also possessed, fortunately for the school, a practical knowledge of business methods and great administrative ability. In addition, he possessed to a rare degree that charm of manner, which won the friendship and confidence of all, not only for himself but for the great enterprise with which he was connected. Of vital importance to the growth of the school was adequate financial support. This he was extraordinarily successful in getting and to his wise and skilful handling of the funds given to the school, largely through his efforts, its success and phenomenal growth were in no small measure due. The esteem that his business ability was held in, is testified to by the fact that he was for many years a director of the Jackson Iron Company, of Lake Superior,

and for several years a director of the New York, New Haven & Hartford Railroad.

He was a member of many learned societies, among them the National Academy of Sciences, the American Academy of Arts and Sciences, an honorary member of the Mineralogical Society of England, a foreign member of the Geological Society of Edinburgh, of the Royal Bavarian Academy of Sciences of Munich. He was president of the American Association for the Advancement of Science in 1881. He received the degree of Doctor of Laws from Harvard University in 1886.

George Jarvis Brush will always occupy one of the foremost places in the scientific and educational history of the country.

C. H. WARREN.

THOMAS JONATHAN BURRILL (1839–1916).

Fellow in Class II, Section 2, 1915.

Thomas Jonathan Burrill was born at Pittsfield, Mass., April 25, 1839. When nine years old his family removed to Stephenson County, Illinois. He attended the Rockport High School and graduated from the State Normal University near Bloomington in 1865. In 1868 he was appointed assistant professor of botany in the University of Illinois and in 1870 he was made professor of botany which position he held until his retirement forty-four years later. He died April 14, 1916, at Urbana, Illinois.

Prof. Burrill's scientific reputation is based mainly on his work on fungi, especially those which cause diseases of plants. In a paper read at the meeting of the A. A. A. S. in 1880 he stated that the fire-blight of the pear-tree and the twig-blight of the apple-tree were due to the same cause, a species of Bacteriaceae to which in a more detailed paper in 1882 he gave the name of *Micrococcus amylovorus*. This was practically the first paper published in this country on the bacterial diseases of plants, a subject which has subsequently been treated by many writers. Burrill also published valuable papers on the fungus diseases of other cultivated plants. The Parasitic Fungi of Illinois in two parts, 1885 and 1887, was an excellent treatise on the Uredineae and

Erysipheae of that State. He also wrote the Erysipheae for the North American Pyrenomycetes of Ellis and Everhart, 1892.

Burrill's work in developing the botanical department of the University of Illinois was important. When he first became connected with the University he was compelled to perform numerous other duties than those connected with the department of botany and in addition to his other duties he served as the first University Librarian. He brought his department up from a very primitive condition to its present high standard. He was a conscientious teacher and a good lecturer and was highly esteemed by the many students who worked under him.

W. G. FARLOW.

SAMUEL HENRY BUTCHER (1850–1910)

Foreign Honorary Member in Class III, Section 4, 1905.

Samuel Henry Butcher, elected Foreign Honorary Member on October 11, 1905, died in London on December 29, 1910.

To the Greeks — and Butcher was primarily a Grecian — success in life is the attainment of unity through an organic and harmonious development of man's finest powers enlisted in the service of the State. Butcher attained such a unity in an eminent degree and in a career that, for a man of learning, was marked by unusual diversity of interests. There are few men who follow the paths of scholarship that display in equal measure as fine an equilibrium of judgment, sincerity and sympathies, undisturbed by the subtle prejudices of inheritance or local association or by the alluring inducements to self-isolation that so easily beset the man of books. By birth an Irishman, and never ceasing to be identified to some degree with the welfare of his native country, he attained his first distinction in England, rose to eminence in Scotland, his home for nearly one third of his life; while his later years saw him in England, devoted to ever increasing responsibilities in the cause of public education and as the representative of his University in the national council.

He was born in 1850 in Dublin, the eldest son of Samuel Butcher, Bishop of Meath. He was educated at Marlborough under Dr. Bradley, and at Trinity College, Cambridge (1869–1873), where he

was Senior Classic and Chancellor's Medallist. His Fellowship at Trinity (1874) he vacated on his marriage in 1876, to the daughter of Archbishop Trench; and having been elected, without examination, to a Fellowship at University College, he removed to Oxford, where his success as a lecturer led to his appointment, in 1882, to the Professorship of Greek at Edinburgh, the successor of a long line of distinguished Hellenists who had adorned one of the most important positions in the British Isles. At Edinburgh Butcher won his fame as an interpreter of the Greek spirit, a teacher to whom personality meant always something finer than learning, a teacher to whom the spoken rather than the written word carried with it the breath of life.

It was at Edinburgh also that Butcher acquired that wide acquaintance with the problems of higher education which was to give him, in later years, an almost unique position in the United Kingdom. He took an important part in the government of the University of Edinburgh, from 1889 to 1896 was a member of the Scottish Universities Commission, and in 1901 a member of the Royal Commission on University Education in Ireland. The writer of the notice in *The Times* of December 30, 1910, says that "during the last twenty years few changes of moment have taken place in any British University in which he was not concerned; and few appointments of importance have been made in which he was not consulted."

In 1903, after twenty-one years of service at Edinburgh, he resigned his professorship there, and removed to London. Freedom here from the routine of academic duties, so far from affording him increased opportunity for literary work, brought with it increased opportunity for service in other fields. He spent himself freely and gladly in furthering the cause of the Classical Association, the Hellenic Society, the British School at Athens, in founding the British Academy of Letters, of which he was President in 1909, as Trustee of the British Museum, and as member of the Royal Commission on Trinity College, Dublin. In 1906 the scope of his duties was still further enlarged by his becoming Member of Parliament for the University of Cambridge in succession to Professor Jebb, to whom, in the sphere of his sympathies in classical scholarship, in the forms of graceful and finished composition in which that scholarship found expression, and in the manner and fields of his public service, Butcher presents interesting points of comparison.

Butcher, as has been said by his intimate friends, possessed an extraordinary faculty of speech for the ordinary purposes of life. An orator he was not in the formal sense of the word; but the writer

of this notice heard him speak with ease, clearness, and force in a debate in the House of Commons on the occasion of a discussion of the affairs of the Universities of Ireland.

The fruitage of Butcher's literary labor is not large, but his every work bears the mark of distinction and of richly dowered culture. His earliest book — the translation of the *Odyssey* (1879) made in coöperation with Andrew Lang — may serve in many respects as a model for future translators of Homer who realize that only in prose can the plain meaning of the original be adequately set forth, and that only in a prose of a somewhat antiquated flavor, with a diction suggestive of the language of the English Bible, can the simplicity, the nobility and the dignity, though not the impetuousity, of the Greek epic be reproduced.

It is not matter for wonder that a scholar who was powerfully attracted by the genius of Burke should have been a profound admirer of the greatest of Attic orators. In 1881 Butcher published, in the series of Classical Writers edited by John Richard Green, a brief but valuable account of Demosthenes; and it was to that orator that he returned in the last period of his life in a critical edition of which he lived to complete two volumes (1903 and 1907). Only the professional scholar can venture to estimate, at their true value, the labor and the skill requisite to the preparation of an *apparatus criticus*, the enforced limits of which hampered the full expression of the editor's unrivalled grasp of the subject.

Butcher's chief contribution to classical scholarship, and the one by which his name will be longest known in the world of scholars, is his book entitled *Aristotle's Theory of Poetry and Fine Art, with a critical Text and Translation of the Poetics* (1895, and in three later editions). Whatever his heresies in the view of the advocates of the traditional interpretation of many vital features of Aristotle's theory of tragic art — and it is not seldom that Butcher disputed current theories — his work corrected many false opinions and shows evidence of an acute intellect in its analysis of the creations of the imagination. Nor should it be forgotten that Butcher's sound sense served him well as a guide in the interpretation of a work the limited pertinency of which to later possibilities of literature he was far from denying. Butcher's study of the *Poetics*, will, I take it, not be superseded even by the edition of Bywater whose learning is massed in an exhaustive commentary.

Butcher, it must always be remembered, never was a commentator; he was first and foremost an interpreter of the spiritual qualities

of life and literature in their larger aspects; and it is to this tendency of his faculties and sympathies that we owe two of his productions, similar in their aim and pervaded by an inner unity of thought — *Some Aspects of the Greek Genius* (1891) and *Harvard Lectures on Greek Subjects* (1904). Both books in scope, content, and manner of handling the theme, give us most of Butcher's personality, so far as the written word can reproduce that charm which made all who knew him love to frequent the places he made happy by his presence. Butcher felt that true learning marched with the love of our human kind; and it is in these two volumes that he shows us at close range how Hellenism had become a material part of himself and how that force to which half of the things of life belong was charged with the mission of clarifying the spirit and moulding character. Both books illustrate the essentially human quality of that scholarship which does not suffer the aridities of learning to bar approach to the sanctuaries of the spirit, a scholarship at once exact, searching, and profound, but withal irradiated by that true culture which translates into present ways of thinking and doing the spiritual heritage bequeathed us by the ancient classical world.

HERBERT WEIR SMYTH.

INGRAM BYWATER (1840–1914)

Foreign Honorary Member in Class III, Section 2, 1894.

Ingram Bywater, Regius Professor of Greek at Oxford 1893–1908, died on December 17, 1914. He was born in London in 1840 and received his early education at the University and King's College Schools. Thence he went as holder of a scholarship to Queen's College, Oxford, where one of his tutors was Robinson Ellis, whose influence must have been an important factor in determining the young man's choice of a career. After taking a first class in classics in the final schools, he was elected a Fellow of Exeter College in 1863; for twenty years he served as tutor and later as University Reader in Greek, until he was appointed by Mr. Gladstone in 1893 as Jowett's successor. After his retirement in 1908 he lived quietly among his

books in London, devoting himself to Greek literature and to minor academic duties until his death.

Mr. Bywater's intellectual interests had a large range, his judgment was penetrating, and his conversation is reported to have been filled with humor and culture. He was indeed a great humanist in the best sense of the word. His wide and accurate learning was distinguished by a rare power of appreciation and discernment which could be fully estimated only by the few; but it was recognized at its true worth by scholars. He received honorary degrees from the Universities of Dublin, Durham, Cambridge, and Athens. He was a Fellow of the British Academy, a Corresponding Member of the Royal Prussian Academy of Sciences, and a Corresponding Member of the American Academy of Arts and Sciences from 1894 to his death. His publications were few, but to use the judgment of another they were "the few ounces of pure gold" which he extracted from base material. His first publication of importance was an edition of the Fragments of Heraclitus, 1877. In 1886 he edited Priscianus Lydus for the Berlin Academy. In 1890 he published an edition of the text of Aristotle's Ethics; this he followed in 1892 with an article on the textual criticism of the same work; a critical edition of the text of Aristotle's Poetics appeared in 1898 (second edition in 1911); and eleven years later he published a new text with introduction, translation, and commentary. The amount is small; but the work is permanent.

CLIFFORD H. MOORE.

HENRY LELAND CHAPMAN (1845–1913)

Fellow in Class III, Section 4, 1912.

Professor Henry Leland Chapman, D.D., LL.D., died on the twenty-fourth day of February, 1913, in the sixty-eighth year of his age. Professor Chapman graduated from Bowdoin College in 1866, and from Bangor Theological Seminary in 1869. From 1869 to 1870 he was tutor in Latin and Mathematics; from 1870 to 1871 instructor; from 1871 to 1872 assistant professor of Latin; from 1872 to 1875 Professor of Latin; from 1875 to 1880 Professor of Rhetoric, Oratory and English Literature; from 1880 to 1897 Edward Little Professor;

and from 1897 to the time of his death Professor of the English Language and Literature. He was a trustee of Bangor Seminary from 1885, and President of the Board from 1887 until 1911. He was trustee of the State Normal Schools from 1890 to 1913. He received from Bowdoin College the degrees of D.D. in 1890, and LL.D. in 1908.

For forty-four years he taught in Bowdoin College with steadily growing grasp of his subject and hold upon the affections of his students. He loved good literature; and had the magic power to impart the love of it to others.

W. DeW. Hyde.

GEORGE HOWARD DARWIN (1845–1912)

Foreign Honorary Member in Class I, Section 1, 1898.

Sir George Darwin is preeminently known for his investigations on the genesis of the Earth-Moon system. Starting with the effects produced by tidal friction he applied mathematics to the solution of a problem which had long been a matter amongst astronomers for speculation only. In a series of papers he was able to show that most of the present features of the system could have been produced by the tidal inter-action of two bodies which were once nearly in contact and, in the early stages at least, of a viscous character. He then undertook another set of investigations in order to see how this close contact might have developed from a single body. This involved an examination of the forms produced when the rate of rotation of a liquid mass is gradually increased. A laborious investigation resulted in the development of the pear-shaped figure of relative equilibrium, the neck of the pear showing to tendency to break off as the angular velocity increased. Thus a continuous development is exhibited which is able to lead to the conditions as far as we know them at the present time. Whether the actual history of the Earth-Moon system is that outlined by Darwin will probably always raise doubts which can never be settled; his hypothesis, however, is the only one worked out by exact methods, and is generally admitted to be much the most probable of all those which have been devised.

In more practical lines Darwin reorganized the methods for analysing and predicting the ocean tides of our globe. In his early years he

was appointed to the membership of a committee of the British Association for the Advancement of Science appointed to consider the subject. Nearly all the work of this committee was, however, done by him, and his numerous papers on the subject exhibit the large amount of time and labor which he gave in order that the methods might be brought into a tractable and convenient form.

All these papers meant heavy algebraical and numerical calculations, for Darwin was never contented until he had brought his results into a concrete form. When they were nearly finished he started to work on a problem which was equally laborious. Hill's paper "Researches in the Lunar Theory" suggested the investigation of the periodic orbits which could be followed by a small body under the attractions of two larger bodies. Solutions of the differential equations which could be conveniently adapted to numerical calculation appearing impossible, Darwin had recourse to numerical quadratures and after some years of work was able to detect and draw a large number of orbits, some of them of remarkable shape. In each case the question of the stability of the orbit is considered.

In spite of indifferent health Darwin was active in various directions. As member of the Meteorological Council in England, and as the British representative on the International Geodetic Association he rendered important services to these bodies which were highly appreciated. His presidency of the British Association in South Africa gave evidence of his ability as a tactful and gracious speaker. As a lecturer he was highly stimulating, and the volume, "The Tides," an outcome of the Lowell Lectures delivered by him in 1897, is a masterpiece of exposition, free from technical language and mathematical symbolism. His personality endeared him to his many friends, and his death is felt by all those who knew him as a personal loss, in addition to creating a great gap amongst the ranks of science in which he filled an honorable place.

E. W. Brown.

GEORGE EDWARD DAVENPORT (1833–1907)

Fellow in Class II, Section 2, 1898.

George Edward Davenport was born in Boston, August 3d, 1833; he was the son of William E. and Deborah (Skidmore) Davenport, both of Boston. He went through the regular course in the Boston schools, graduating from the High School. In 1853 he married Miss Mary Frances, and in 1875 he removed to Medford, Massachusetts, where he resided for the rest of his life, dying Nov. 27, 1907.

His interest in botany began in his school days; at first it was general, but soon concentrated on ferns. Though their study was only an avocation in connection with an active business life, he was soon recognized as a careful and accurate student. For many years he was in continual correspondence with Professor Daniel C. Eaton of Yale, and contributed much to the completeness of Eaton's great work on the Ferns of North America. After Eaton's death Mr. Davenport became the recognized authority on North American ferns. He never published any extensive work but many and valuable shorter papers. A list of his botanical writings, by Miss Mary A. Day, librarian of the Gray Herbarium, was published in Rhodora, Vol. X, p. 1, January, 1908, and includes 109 numbers. When at last he was able to give up business, and could give his time more freely to his favorite studies, his strength and his sight were unequal to the task of completing the manual of North American Ferns, which he had planned many years before, and to which he had already given much time.

His knowledge of ferns was not merely nor mainly a knowledge of herbarium conditions; he studied them growing wild, and at his home in Medford he had under cultivation and observation nearly every form growing in New England, as well as flowering plants adapted for studies of variation and heredity. His thorough scientific knowledge of plants did not impair his appreciation of their beauty, and he was a lover of nature all his life. He was one of the most active in the work of securing for the public the Middlesex Fells, the beginning of the chain of reservations of wild lands, of which Boston is now so proud. In early life he was active in the anti-slavery movement, later interested in labor conditions and developments; always enthusiastic and ardent; sensitive, kind-hearted, but unyielding in his convictions. He was a life member of the Massachusetts Horticultural Society and an original member of the New England Botanical Club.

F. S. Collins.

GEORGE DAVIDSON (1825–1911)

Fellow in Class I, Section 1, 1887.

George Davidson was born in Nottingham, England, on May 9, 1825. Coming to the United States when a boy, he completed the course of study in the Central High School, Philadelphia, in 1845. He entered the service of the United States Coast Survey on June 1, 1845, in Washington, as secretary to Superintendent Bache. He served also as a computer and in other capacities.

The needs of navigation for accurate knowledge of the Pacific coast-line were recognized by the authorities in Washington shortly after the territory of California was acquired from Mexico. The first requirements were determinations of the latitudes and longitudes of the prominent capes, head-lands and entrances to the harbors, hydrographic surveys of the harbors, and topographic surveys of harbor surroundings. Davidson was the oldest member and the leader of a party of three sent to the Pacific Coast shortly after the discovery of gold in California, for the purpose of starting the accurate work of the Survey. The party arrived in the summer of 1850. With the exception of five years, coinciding approximately with the Civil War, Davidson's home was in San Francisco continuously until the date of his death, December 2, 1911.

Assistant Davidson's first observing station on the Pacific Coast, in 1850, was located at Point Conception, the most prominent and dangerous angle in the western coast-line of the United States. He determined the latitude and longitude, the variation and dip of the magnetic needle, and he reported upon the best location for the proposed light-house in that neighborhood. In the next four years other stations were occupied at prominent points on the coast between Puget Sound and Monterey. Astronomic, magnetic, hydrographic and topographic data which were accumulated with extraordinary rapidity were woven by him into a report as early as 1855, and issued as a guide to mariners. Davidson's Directory for the Pacific Coast, issued in 1858, was a remarkably accurate and comprehensive work, embodying his own and other authentic data affecting maritime interests on the coast.

The construction of the Union and Central Pacific Railways and the establishing of telegraphic connection between the Atlantic and Pacific Coasts enabled the longitude determinations on the Pacific Coast to be placed upon an accurate basis. The Pacific end of the longitude time comparisons with Harvard College Observatory was

conducted by Mr. Davidson in a temporary observatory set up in Washington Square, San Francisco. Telegraphic signals were exchanged with Cambridge on twelve nights in February, March and April, 1869.

In June, 1895, Davidson resigned his position in the Coast Survey, at the conclusion of fifty years of service. During the last twenty-seven years of this period he was Assistant in Charge of all Coast Survey operations on the Pacific Coast of the United States.

The reports of the U. S. Coast Survey show that he never failed to grasp opportunities for making observations which promised to be useful in any branch of astronomy, pure or applied. He observed the total eclipse of the Sun of August, 1869, on the Chilkaht River, Alaska, and the total eclipse of January, 1880, on the summit of Santa Lucia Mountain in central California. He observed the transit of Venus, in behalf of the U. S. Government Commission, in Japan in 1874 and in New Mexico in 1882. He observed the transit of Mercury in the Sacramento Valley in 1881. He observed meteors and star occultations on many occasions. He was interested in testing atmospheric conditions as affecting astronomical observations. As a labor of love he made thousands of observations of latitude-pairs of stars, as a contribution to the subject of terrestrial latitude variation.

Davidson's influence with James Lick, when Mr. Lick was formulating plans for erecting the most powerful telescope in existence, was potent, and perhaps even vital to a practical solution of Mr. Lick's problem.

Professor Davidson was president of the California Academy of Sciences for sixteen years, and president of the Pacific Geographical Society for thirty years. He was an authority on the voyages of the early explorers of the Pacific Coast, and on the early history of the Coast. At various times and during periods of different lengths he served on the Irrigation Commission of California, on the Advisory Harbor Improvement Commission for San Francisco, on the Mississippi River Commission, on the United States Assay Commission, and as a Regent of the University of California. During the last years of his life he was Professor of Geography in the University of California. His life was devoted with untiring energy and complete unselfishness to the interests of science on the Pacific Coast. It is no exaggeration to say that during sixty years Professor Davidson's name was more familiar to the scientifically-inclined inhabitants of the Pacific Coast region than that of any other resident.

W. W. CAMPBELL.

THOMAS MESSINGER DROWN (1842–1904)

Fellow in Class I, Section 3, 1887.

In the death of Dr. Thomas Messinger Drown, late president of Lehigh University, both the educational and scientific interests of the country suffered a severe loss.

Dr. Drown was born in Philadelphia, March 19, 1842. He attended the schools of that city, graduating from its High School in 1859, from which he entered the medical department of the University of Pennsylvania, receiving the degree of doctor of medicine in 1862. As the interest aroused in him by the study of therapeutics or surgery during this period was less keen than that for chemical science, he devoted but a short time to medical practice, again becoming a student, this time of chemistry, at the Sheffield and Lawrence Scientific Schools, and also serving as assistant under Professor Gibbs at the latter institution. His study of chemistry and metallurgy was continued at the University of Heidelberg and at the School of Mines, at Freiberg, Saxony, where he had exceptional opportunities to meet some of the masters in these sciences and to learn their methods of teaching and investigation. Returning to America with a training in metallurgical chemistry of unusual excellence, he opened an office as analytical chemist in Philadelphia and maintained it for several years. In 1874, he became professor of chemistry in Lafayette College and retained that position until 1881. In 1873 he was elected to the secretaryship of the American Institute of Mining Engineers, of which he was a charter member, holding that office until 1883, and serving as its president in 1897–1898. In 1885 he accepted the professorship of analytical chemistry at the Massachusetts Institute of Technology and was soon after placed in charge of the chemical department. This position he resigned in 1895 to accept the presidency of Lehigh University, which he held at the time of his death. He also retained a connection with the Massachusetts State Board of Health, begun in 1887, as consulting chemist.

He received the honorary degree of Doctor of Laws from Columbia University in 1895. He was elected Resident Fellow of the Academy in March 1887, and was an Associate Fellow at the time of his death, which occurred November 16, 1904, after a brief illness.

Dr. Drown will long be remembered as a successful and unusually inspiring teacher by the many students who came under his influence

at Lafayette College and at the Massachusetts Institute of Technology. His methods of teaching were broad, and looked toward high ideals, and while he furnished incentive for the man of quick intellect, he had a keen and generous sympathy for the slow worker.

His published papers afford abundant evidence of his industry, clear thought and critical judgment, as well as of his power to originate, plan and execute important investigations. His papers in the Transactions of the American Institute of Mining Engineers constitute a record of his efforts to improve the quality of analytical procedures in connection with metallurgical chemistry, both by contributions from his laboratory and through the development of a rational discussion of the subject. The series of papers which form a part of the Reports of the State Board of Health of Massachusetts record the results of the extensive work which has become both an inspiration and a model for the investigation of water supplies throughout the country, and also contain the records of other investigations undertaken in connection with the Board of Health. These alone constitute a worthy memorial.

His administration of the office of secretary of the Institute of Mining Engineers, and that of head of the Chemical Department of the Institute of Technology, and especially his success as president of Lehigh University, all attest his executive ability, and each will long reflect something of his clear judgment, broad thinking and systematic methods.

In Dr. Drown a gentle nature was combined with marked executive ability, and broad, scholarly culture with scientific attainment. This was reflected in his administrative work, which he carried with a firm, but never with a rough hand. While generous and sympathetic, he was always just in his judgment of others, and this combined with an exceptional personal charm, and an unselfishness such as is seldom equaled, endeared him to pupils, colleagues and friends, who will remember him not only as one who won their regard, and often their affection, but also as one who equally compelled their esteem because of his attainments as an educator and as a scientist.

H. P. TALBOT.

GEORGE PARK FISHER (1827–1909)

Fellow in Class III, Section 3, 1891.

George Park Fisher was born at Wrentham, Mass., August 10, 1827, the son of a country lawyer. He graduated from Brown University in 1847, and studied theology at Yale Divinity School and Andover Theological Seminary, graduating from the latter institution with the class of 1851. With plans already formed for the career of a scholar and teacher he continued his theological studies at Andover and in Germany. In 1854 he was ordained to the ministry of the Congregational Church, and became college pastor and Livingston professor of divinity in Yale College, in 1861 he was transferred to the professorship of ecclesiastical history in the Yale Divinity School. When in 1901 he retired to become professor emeritus, his active service as a professor at Yale had covered 47 years. He received honorary degrees from Brown, Edinburgh, Princeton (both LL.D and D.D.), and Harvard, and had the distinction of receiving three honorary degrees (A.M., D.D., and LL.D.) from Yale.

He died at Litchfield, Connecticut, December 20, 1909, in his eighty-third year.

Professor Fisher's life was occupied with Christian theology, with church history, and with the public affairs of the Congregational denomination. Several of his best known books had to do with questions of apologetics and the more general aspects of Christianity, as the titles indicate, "Faith and Rationalism," "The Grounds of Theistic and Christian Belief," "The Nature and Method of Revelation." His disposition and mode of thought was that of a moderate and free conservatism, and an urbane, but insistent, tolerance. Heartily contemptuous of everything which savored of obscurantism or ran counter to the plain facts of science or history, he was a loyal and devout believer in the doctrines of Protestant Christianity. From the active and bitter controversialism of the Massachusetts churches in which he was reared, and from New England scholasticism as exemplified in Professor Park's theology, he turned away to the milder type of Connecticut orthodoxy. This moderate position and his own wise and statesmanlike temper gave him great influence in the Congregational body in a period of change; his part in preventing reactionary forces from gaining control was large and his service of lasting effect.

As a church historian Professor Fisher's learning was comprehensive and exact. He was a student of the broad field of his department of knowledge rather than an investigator of limited topics, and his chief historical works are of the nature of textbooks and literary surveys rather than contributions to knowledge. They include a general "History of the Christian Church," a "History of Christian Doctrine," "The Beginnings of Christianity," a "History of the Reformation," besides "Outlines of Universal History," and "Colonial History of the United States."

The distinction of Professor Fisher's personality and the charm of his witty and delightful conversation will never be forgotten by those who have enjoyed his companionship.

JAMES HARDY ROPES.

REGINALD HEBER FITZ (1843–1913).

Fellow in Class II, Section 4, 1889.

Reginald Heber Fitz was born in Chelsea May 5th, 1843, and died in Brookline September 30th, 1913. His father was a native of Boston and was for many years the secretary of Daniel Webster and in the consular service of the United States. He was descended from an old Portsmouth family of that name.

Dr. Fitz was prepared for college in the Chauncy Hall School and graduated from Harvard in the class of 1864. He began his medical studies in Cambridge under Jeffries Wyman and graduated from the Harvard Medical School in 1868. He was a house officer at the Boston City Hospital from 1867–68. After receiving his medical degree he went to Europe to complete his education and was one of the earlier group of medical students who turned to the schools of Vienna and Berlin for information as to what was newest in medical science in that day. As a scholar of high standing all through his medical curriculum and a pupil of Virchow and other great scientists of the day he came home with a reputation already made to lead the way in study and teaching of modern pathological anatomy. His promotion was rapid and in 1878 he was made Shattuck Professor of Pathological Anatomy, thus strengthening the Harvard Medical School in a

department of medicine which needed the services of one trained in modern methods of investigation. He also received the appointments of microscopist and curator of the pathological cabinet of the Massachusetts General Hospital in a new building equipped with all the necessary appointments for post-mortem examinations. Dr. Fitz found here an opportunity to study many unsolved problems in this department of medicine. While devoting himself thus early in his career to the scientific side of his profession, he never for a moment lost touch with clinical medicine and so it came about that he was able to compare the symptoms of disease with its pathological changes.

In 1886 he presented to the Association of American Physicians a classic monograph entitled "Perforating inflammation of the Vermiform Appendix with special reference to diagnosis and treatment." To this affection he gave the name of "Appendicitis," a new word in the medical dictionary. This paper was followed in 1889 by one on "Acute Pancreatitis," thus calling attention to another important source of abscess formation in the abdominal cavity.

On resigning the Chair of Pathology in 1892, he was made Hersey Professor of the Theory and Practice of Physic, a position which he held until 1908, when, on his retirement, he was made Professor Emeritus.

Dr. Fitz was married in 1879 to Elizabeth Loring Clarke, daughter of Dr. Edward H. Clarke, a distinguished Boston physician.

In 1905 he received the honorary degree of LL.D. from Harvard and in 1907 he was made President of the American Congress of Physicians and Surgeons. At the annual meeting of the British Medical Association following his death, the reader of the address in surgery referred to Dr. Fitz as "the greatest of physicians." He was a pioneer in modern medicine and at the time of his death he was regarded as one of the leading internists of this country.

J. COLLINS WARREN.

SIR MICHAEL FOSTER (1836–1907)

Foreign Honorary Member in Class II, Section 3, 1896.

Sir Michael Foster was born at Huntingdon, England, March 8, 1836. In school he distinguished himself in classics, and in 1854 took his B. A. degree at London University on the Arts side. His bent was toward the classics, but being a Non-conformist he was debarred from the fellowships at Cambridge that he might otherwise have taken. Instead he followed his father's footsteps and studied medicine at University College, London, where he took the M. D. degree in 1859.

After a year of study in Paris he was sent away for his health, being threatened with pulmonary disease. This danger obliged him throughout his life to spend much time out of doors.

In 1861 he began the practice of medicine with his father. This he continued for six years. Then he accepted an invitation from his former teacher, Sharpey, to give a course of practical physiology at University College, thus beginning his career as a scientist and abandoning the practice of medicine.

At this stage in his career Foster was much influenced by Huxley whom he succeeded as Fullerian Professor of Physiology at the Royal Institution in 1869. And when in the next year Huxley commenced his course of elementary biology at South Kensington, Foster among others assisted him.

It was largely through his connection with Huxley that Foster became identified with the great change which occurred in the science of physiology during his life; a change in which he was perhaps the most active leader. Hitherto physiology had in general been treated descriptively as a mere adjunct of human anatomy; the statements were largely based on familiar observations and on inferences drawn from the study of structure. The great advances which have marked the new era have come through the introduction of the experimental method.

Perhaps the most important event in this movement was the establishment in 1870 by Trinity College in the University of Cambridge of separate teaching in physiology. Huxley was consulted by the originators of the project, and at once recommended Foster for this work. He was made Trinity Praelector of Physiology, working in the University, but having no official connection with it. He was

allowed one small room in which to conduct his lectures and laboratory work in histology and experimental physiology. He was assisted by H. Newell Martin who came with him from London. From this beginning arose the whole Biological School of Cambridge which in 1914 had become one of the great centres of physiological research.

Foster's teaching was a revelation, and his enthusiasm led many of his pupils to devote their lives to physiology. Soon he had gathered round him a group of helpers among the first of whom were Gaskell, Langley, Lea and Dew Smith.

In 1883 when a professorship of physiology was founded at Cambridge, Foster was elected to the chair. He was a strong believer in making the students learn physiology through experiments which they themselves performed; and he insisted that a course of lectures must be closely coordinated with the laboratory program.

Besides being the leader in bringing physiological research and teaching to their own in England, he did great service in being the prime mover in the formation of the Physiological Society in 1876, and two years later in founding the Journal of Physiology. In 1881 he planned with Kronecker the organization of the International Congress of Physiologists which has been held every three years ever since.

In 1872 he was elected a fellow of the Royal Society, and from 1881 to 1903 he served as one of its secretaries. He gave much of himself to the work of the Society. Through it he came in touch with the Government, and was appointed to serve on various Royal Commissions. In 1899 he was made a K. C. B.

In 1900 upon the urging of his friends he was a candidate for election to Parliament as representative of London University. He was elected and served with considerable influence until 1906. His duties in Parliament proved to conflict with his professional ones and he resigned his professorship in 1903. After his retirement from Parliament he continued actively at work at his duties on public Commissions till the day of his death, January 28, 1907.

He was married twice. His first wife whom he married in 1863, died six years later, leaving him with two children. His second marriage took place in 1872.

Foster's original researches were few in number but of the highest quality, both with respect to conception and execution. His great achievement was rather one of personal influence exercised in behalf of science in general and physiology in particular. His 'Text-book of Physiology' published in 1877 was recognized as superior to any other and has appeared in six successive editions.

His influence on physiology in America has been great, especially in that through his influence H. N. Martin became Professor of Physiology at Johns Hopkins University in 1876.

In closing it may be fitting to mention the great monument which marks his career in the unique group of physiologists which it was my privilege to see gathered together in the Cambridge laboratory in 1912. Here, with Gaskell retired but still keeping in touch with the work, and with Langley at the head, was a constellation of physiological stars probably unsurpassed by any other group. Many branches of physiology were being investigated by men of exceptional ability. But what commanded my admiration especially was the work of Lucas and his coworkers who in the years 1904 to 1914 threw more light on the fundamental functional properties and vital phenomena in the excitable tissues, nerve and muscle, than had been thrown by all previous workers. This work, whose influence on physiological thought has only begun to be felt, redounds of course chiefly to the credit of the workers themselves. But it is probable that none would be readier than the Cambridge physiologists of today to agree that Foster's influence in creating the school is a factor without which it would be impossible to picture the result as it has been realized in the present decade.

ALEXANDER FORBES.

MELVILLE WESTON FULLER (1833–1910)

Fellow in Class III, Section 1, 1900.

Melville Weston Fuller, Eighth Chief Justice of the United States, was born at Augusta in Maine on the 11th day of February, 1833. He entered Bowdoin College at the age of sixteen, after his graduation studied law at the Harvard Law School, and began the practice of his profession in his native city. He shortly afterwards became city attorney, served as an alderman, and was the editor of *The Age* which was the rival of the *Kennebec Journal*, at that time controlled by James G. Blaine. Though he rose thus rapidly at home he was not satisfied with the opportunities which were offered to him in Maine, and at the age of twenty-three he emigrated to Chicago, where he commenced life anew. His practice in Chicago was large and varied, and he won

a high position at the bar of Illinois, but he had not gained a national reputation at the time of his appointment to the Supreme Court.

As a citizen he was interested in politics though he held no political office, and he was a Democrat by conviction, always in sincere sympathy with the principles upon which the government of the United States was founded. He was a man of thorough cultivation and extensive reading, and had acquired a high reputation in Illinois as a speaker before he became Chief Justice. He was frequently called upon to review the books of the day, and his literary judgment was excellent, his taste severe.

The Chief Justiceship came to him without his knowing that his name was even considered, and the first notice of his appointment was received in April, 1888, when the newspaper man who had been waiting for some time was admitted to his office and said: —

"Well, Mr. Fuller, can I say that you will accept the appointment?"

"The appointment, what appointment?"

"To the Chief Justiceship, surely you have heard?. . . ."

"Not a word."

President Cleveland, who appointed him explained his selection as follows:

"When I had to assume the responsibility of appointing a Chief Justice of the Supreme Court of the United States in succession to Morrison R. Waite, my first impulse after the office had been declined by John G. Carlisle, then Speaker of the House, was to tender the office to James C. Carter, or some other eminent advocate or leader of the Bar, or to Mr. Phelps, then our minister to the Court of St. James. Upon consultation with the associate justices I found that some elements generally overlooked had to be considered . . . . The justices informed me that as the Court could not be enlarged because both public and legal opinion were opposed to this process, the one thing needed was a Chief Justice who would also be a man of efficiency as business manager. This put the whole question before me in a new light, and I delayed the nomination for a time until I could look about and find a lawyer who possessed all the usual qualifications and also this added one.

This was a determining factor in the choice of Melville W. Fuller, then almost a stranger to me personally."

In later years Mr. Cleveland looked back upon his choice with great satisfaction, and said that while the Chief Justice had shown himself "an industrious, safe and able judge, he has also commended himself as probably the best business manager ever seen at the head of any of our high Federal courts."

The acceptance of the appointment involved a distinct sacrifice since Mr. Fuller had a family of eight daughters and one son, a considerable burden to carry in his new position when it is remembered that by taking it he exchanged a large professional income for the small salary of the Chief Justice.

From the date of his appointment in 1888 until his death on the 4th of July, 1910, Chief Justice Fuller discharged the duties of his office to the entire satisfaction alike of his associates on the Bench, the counsel who appeared before him and the American people.

The judgment of his profession was expressed in the resolutions which were drawn by a representative committee of the bar and from these the following may be quoted: —

"He was a man of singular beauty and purity of character.

"While he was at the bar no one harbored a suspicion that the exigency of forensic controversy, in which he was almost constantly engaged, could ever tempt him to aught that was unfair or unworthy of the highest ideals of a noble and honorable profession.

"As Chief Justice it is enough to say that with conspicuous fidelity he fully and consistently maintained the best traditions of that high office.

"His character was marked by a gentle courtesy and consideration which constantly illuminated and attended upon the discharge of his important public duties, always marked his relations with the bar, and earned that popular confidence which goes out to him whom the people believe to be a merciful and considerate as well as a just and impartial judge.

"All this he was; and, endowed by nature with talents not inferior to those of his predecessors, possessed of attainments, training and experience adequate to the exacting requirements of his great office, he filled it at all times in such a manner as to command the admiration and respect of the bar and the grateful appreciation of his countrymen."

During the twenty-two years on the bench he wrote 829 opinions, of which only 29 were dissenting opinions. His period of service was one of the most important in the history of the country, as during this time many startling innovations were made or attempted in our legislation such as the laws intended to curb the abuses of capital, to purify the methods of business and to restrain immigration, and during this period also came the departure from principles theretofore regarded as fundamental which followed the Spanish War and the conquest of the Philippine Islands.

In dealing with the controversies which grew out of this legislation,

the Chief Justice was inclined to construe the constitution strictly, and not to enlarge by implication the powers of the legislative or executive officers of the United States. He was always a conservative force in the Court. His opinions in the Income Tax case, *Pollock* v. *Farmers' Loan and Trust Co.*, in the *Danbury Hatters'* case, in the first case arising under the anti-trust law, *United States* v. *Knight*, in the contempt proceedings against the sheriff of Chattanooga, in all of which he announced the conclusions of the Court, were approved by the profession and there are many who are inclined to think that his dissenting opinions in the case of the Mormon Church, the Insular cases, and others presented the true view of the law.

In the words of the Attorney-General his "opinions are all characterized by a simple lucidity of statement and a directness of reasoning free from subtlety," and in the words of his successor, Chief Justice White, his career as a judge was characterized by "untiring attention to his judicial duties and the dedication which he made to the efficient and wise performance of those duties of every intellectual and moral power which he possessed; his love of justice for justice's sake, his kindness, his gentleness, associated, however, with the courage which gave him always the power fearlessly to do what he thought was right, without fear or favor," and he added, "The source whence these endearing and noble qualities were derived was not far to seek. It was faith in the power of good over evil; faith in the capacity of his fellow-men for self-government; faith in the wisdom of the fathers of our institutions; faith, unshaken faith, in the efficiency of the system of constitutional government which they established and its adequacy to protect the rights and liberties of the people."

The Court during his administration was often divided and dissenting opinions were common, as was conspicuously true in the Insular cases where one judge in effect decided the cases by agreeing first with one minority and then with another, and in so doing reached a conclusion by paths which his eight associates declined to follow. The questions before the Court were of such a character that a difference of opinion was in many cases inevitable, but it is to be regretted that the dissents were so frequent, and that there was no force on the bench able to harmonize the conflicting views of its members.

While not a man of commanding intellect, his abilities and his acquirements as a lawyer fitted him fully to discharge the duties of his high office. His rare personal charm and the unvarying courtesy with which he met all who came before him made him the most popular Chief Justice who ever held that position on the bench until

the moment of his death, and though he died in the fulness of years, he retained his intellectual powers to the end, and his death left a genuine feeling of sorrow among all who had known him either at the bar, during his career on the bench, or in the more intimate relations of private life.

MOORFIELD STOREY.

HORACE HOWARD FURNESS (1833–1912)

Fellow in Class III, Section 4, 1897.

Horace Howard Furness was born in Philadelphia on November 2, 1833, the son of Dr. William Henry Furness, the well-known Unitarian minister and author. After graduating from Harvard in 1854, he travelled in Europe for two years, returning to study law in Philadelphia. Though admitted to the bar in 1859, he was prevented by deafness from taking up practice; and the same infirmity hindered him from active service in the Civil War. He was thus led to adopt the career of a private scholar, being the fortunate possessor of means sufficient to enable him to devote himself to his chosen studies without regard to their earning power, and to collect around him a library with few rivals in its field.

The enthusiasm for Shakespeare, which, it is said, was kindled in him as a boy of fourteen by hearing Fanny Kemble read, led him while still a very young man to begin the serious study of the plays; and gradually there formed in his mind the plan for the great work with which his name will always be associated. No attempt to sum up compendiously the results of Shakespearian criticism had been made since the publication of the Boswell-Malone edition in 1821, and meanwhile much had happened in this department of scholarship. The new methods of approach to Shakespeare represented by such critics of the Romantic period as Coleridge, Hazlitt, and Lamb had added a whole region to the domain of criticism; and the investigation of Shakespearian problems on the Continent, and especially in Germany, had vastly increased the area over which a student had now to work in order to come abreast of the scholarship of the day. The Cambridge edition of 1863 had, indeed, marked an epoch by recording in full the readings not only of all early editions but of all important later critics

of the text. But the collations of Clark and Wright gave no clue to the extent to which any particular reading had been adopted by subsequent editors, and Dr. Furness felt that this lack of guidance as to the balance of authority was a serious defect.

After mature deliberation and long preparation, he resolved to supply this want, and in 1871 appeared *Romeo and Juliet* as the first volume of *A New Variorum Edition of Shakespeare*. This colossal undertaking, however, accomplished much more than the supplementing of the work of the Cambridge editors on the text. It summarized with great skill and conciseness, usually in the actual words of the commentators, all the criticism, textual, exegetical, and appreciative, down to Dr. Furness's own day. The appendices gave in similar fashion the gist of discussion and research on matters of date, sources, authenticity, and the like, with descriptions of the leading rôles as interpreted by great actors. In short, it summarized everything of value — and, inevitably, much of no value — that had been written which could throw light on the dramas or form the basis for further investigation; and this was done not only for English scholarship but for all the countries where Shakespeare is studied. In the forty-one years between the publication of the first volume and his death, Dr. Furness completed fourteen plays — the fruit of extraordinary industry, vast scholarship, and an admirably sane judgment.

For it would be a mistake to suppose that his work was that of a mechanical compiler. Every page bears token of his penetration and acuteness; and in the later volumes he allowed himself much greater freedom in the passing of judgment on disputed questions; so that, between his interjected comments and the prefaces in which he was accustomed to let himself go at the conclusion of each stage in his great task, the reader who never saw him comes to form no vague idea of his genial and witty guide.

Recognition of the magnitude of the service undertaken by Dr. Furness came early and continued to grow to the end of his life. He received many honors: Ph.D. from Halle; Litt.D. from Columbia and Cambridge, England; LL.D. from Harvard, Yale, and Pennsylvania. Notable among his memberships of learned societies was his presidency of the German Shakespeare Society. When he died on August 13, 1912, he was recognized throughout the world as belonging to the first rank of Shakespearian scholars, and as having placed all future workers in his field under infinite obligations by his untiring industry, his insight, and his patient fairness.

W. A. Neilson.

WOLCOTT GIBBS (1822–1908)

Fellow in Class I, Section 3, 1849.

A pathfinder in American chemistry, a fellow of this Academy from 1849 until the end of his life, and one of the founders of the National Academy of Sciences, Wolcott Gibbs was an important contributor to the scientific development of this Country. He was born on February 21, 1822, and lived for over 86 years. At the time of his death on December 9th, 1908, he had been for a long time almost the only survivor among our chemical pioneers, and for over a decade he had headed in academic seniority the list of the Faculties of Harvard University.

Wolcott Gibbs's childhood was spent partly in Boston and partly in New York, where he graduated from Columbia College at the age of 19 in 1841. His first scientific publication had already appeared while he was in college, and afterwards he became Robert Hare's assistant in Philadelphia. In 1848, he was made assistant professor at the College of Physicians and Surgeons in New York, and in 1849 full professor of chemistry and physics in the newly founded Free Academy, later the College of the City of New York. Here he remained for 14 years. His Unitarian faith having excluded him from a proposed professorship in Columbia University, he was called in 1863 as Rumford professor to Harvard University, where he had charge of the chemical laboratory of the Lawrence Scientific School, and gave lectures on light and heat. Here, largely devoting himself to his own researches because of the special circumstances involved in the separation of his laboratory from the field of undergraduate work, he served until 1887, when he was made professor emeritus, and retired to the quiet life in his garden on Gibbs Avenue at Newport, R. I., and his private laboratory not far away.

It is impossible here to present a detailed survey of the greatly varied fields in which his work lay, but a brief sketch will give some idea of the activity of his scientific undertakings and imagination. His first important research concerned the complex ammonia-cobalt compounds, one of the most interesting series among inorganic substances. This masterly work, conducted with the collaboration of F. A. Genth, shed much light upon the puzzling nature of complex compounds in general, and laid the foundation for one of the most elaborate of modern chemical theories. The following years (1860–4)

saw him employed upon a careful study of the platinum metals, upon which he was engaged when he accepted the call to Cambridge in 1863. Shortly afterward (1865) he published for the first time a description of his use of the voltaic current for depositing copper and nickel in such a manner that the deposited metals could be directly weighed — thus providing a simple and exact quantitative method for the analysis of substances containing these metals. His sand-filtering device of 1867 may be said to have been a forerunner of the present admirable apparatus perfected by Gooch and Munroe.

Not long after coming to Harvard, Gibbs turned his attention to the precise use of the spectrometer in chemical investigation, and this work was continued in 1869. In succeeding years he attacked the complex inorganic acids, composed of various combinations of tungstic, molybdic, phosphoric, arsenic, antimonic and vanadic acids.

From inorganic chemistry he later turned for a short time to a very different subject, undertaking with H. A. Hare and E. T. Reichert, a systematic study of the action of definitely related chemical compounds upon animals. This research, which appeared in 1889 to 1894, together with occasional previous papers upon organic chemistry, afforded evidence of the breadth of his interest.

Although Wolcott Gibbs was essentially an experimentalist, he was one of the first of American chemists to appreciate the importance of thermodynamics. His influence was the prime factor in having caused the award of the Rumford medal to J. Willard Gibbs as early as 1880, long before the world at large appreciated the fundamental character of the work of the Yale physicist.

His contributions to Science were recognized in America by his election to the presidencies of the National Academy of Arts and Sciences and of the American Association for the Advancement of Science; and abroad he was honored by honorary membership in the German Chemical Society and corresponding membership in the Royal Prussian Academy. His enthusiastic spirit, his tireless energy, his generous recognition of everything good, and his warm human friendship endeared him to all who knew him. The Wolcott Gibbs Memorial Laboratory of Harvard University, one of the most important monuments ever erected in memory of a chemist, will serve posterity as a lasting reminder of his many-sided eminence.

THEODORE W. RICHARDS.

SIR DAVID GILL (1843–1914)

Foreign Honorary Member in Class I, Section 1, 1910.

David Gill was born at Aberdeen, Scotland, on June 12, 1843. His higher education was received in Marischal College and University, Aberdeen. There he came under the inspiring influence of James Clerk Maxwell. Gill's tastes had developed along the lines of physics and chemistry, but his father, who was a prosperous horologist, influenced the son to enter the clock business. David Gill mastered both the commercial and the technical sides of the work, but he did not cease to dream about a career in pure science. Such time as could be spared from business, beginning with 1863, he devoted to re-establishing the observatory of King's College in Aberdeen University, as a basis for supplying accurate time signals to the university and city. In the years 1868–73 he gave much spare time to the construction and use of his own observatory in Aberdeen. He designed the mounting for a 12-inch reflecting telescope, and with his own hands constructed the excellent driving clock of the telescope. His observations related mostly to double stars and nebulae.

In 1872 he gave up his well established and prosperous business in order to devote his talents exclusively to astronomical science. He accepted the invitation of the Earl of Crawford and his son, Lord Lindsay, to take charge of the splendid private observatory which they had decided to construct at Dun Echt. Lord Lindsay's plans included an expedition to the Island of Mauritius to observe the transit of Venus, in 1874. Lindsay and Gill took advantage of the trip to determine the longitude of Mauritius, by means of telegraphic signals sent between Greenwich and Aden, and thence by transport of chronometers between Aden and Mauritius. While at Mauritius Gill made heliometer observations of the minor planet Juno, for a new determination of the value of the solar parallax. This was the beginning of a long series of heliometer observations by Gill to improve our knowledge of the Sun's distance from the Earth.

On the return journey from Mauritius Gill accepted the invitation of the Government of Egypt to measure a primary base line near the Pyramids of Gizeh for the projected geodetic survey of Egypt.

Gill's expedition to the Island of Ascension to observe Mars at the especially close approach of that planet in 1877, to determine anew the solar parallax, was a memorable event in his career. The success

of his work on the Mauritius and Ascension expeditions was the chief factor leading to his selection as Her Majesty's Astronomer at the Cape of Good Hope, in the year 1879. The Cape Observatory had enjoyed an honorable history, dating back to 1820, and the traditions as to its most profitable fields of activity were well developed. Gill accepted these traditions as a guiding principle, but his ability as an observer, his mechanical skill in designing practicable instruments of greater power and accuracy, and his enthusiasm and energy gave new life to the institution, and in a few years it was in the front rank of existing observatories. His administration was marked by a great expansion of financial and personal resources; by the development of the heliometer method of determining solar parallax and stellar parallaxes; by marked advances in our knowledge of the distances of the Sun and the brightest stars; by more accurate and more extensive observations of stellar positions, with improved meridian instruments; by a photographic durchmusterung of the southern sky between declination $-18°$ and the South Pole, which made available the approximate positions of 400,000 stars, a work in which Professor Kapteyn collaborated heroically; by the inauguration of spectrographic observations for determining the radical velocities of the southern stars; by a splendid determination of the solar parallax from the radial velocities of certain stars; and by many other contributions in instruments, methods and results which lack of space prevents us from describing.

Gill's influence was not confined to the Cape Observatory. It was one of the chief factors in inaugurating and carrying forward the International Photographic Catalogue plans, which involve the laborious charting of the entire sky by photography, on the scale of 1 mm. to one minute of arc, by many observatories.

In no direction were Gill's technical and administrative ability and his personal influence more potent and wise than in the plans for the Geodetic Survey of South Africa. The political aspects of the problem were not simple, for his plans related to a comprehensive system of triangulation extending over several independent states. The physical difficulties resulting from climatic and other conditions were formidable. In no continent have the plans for geodetic surveys been conceived and carried out with higher standards.

A long list of honors came to Gill in recognition of his services to his country and to science. He was created Companion of the Bath in 1896, and Knight Commander in 1900. He was appointed a Commander of the Legion of Honor (France) in 1908, and a Knight of the

Prussian order "Pour le Merite" in 1910. He was a correspondent of the Institute of France and of the Paris Bureau of Longitudes; a foreign member of the Academies of Sciences in Berlin, Rome, St. Petersburg, Amsterdam, Haarlem, and Stockholm; a foreign member of the National Academy of Sciences, of the American Academy of Arts and Sciences, of the American Philosophical Society, of the Italian Spectroscopic Society, etc.; an honorary member of the New York Academy, of the American Astronomical Society, etc. He was president of the British Association for the Advancement of Science in 1907–8. He was honored by appointments to many other national positions in South Africa and in Great Britain. He received the Watson Gold Medal of the National Academy of Sciences in 1900; the Bruce Gold Medal of the Astronomical Society of the Pacific in 1900; the Gold Medal of the Royal Astronomical Society in 1882, and a second time in 1908; the Valz Medal of the Paris Academy in 1882; and the Royal Medal of the Royal Society in 1913.

Gill retired from service at the Cape in 1907. His lamented death occurred in London on January 24, 1914. The intervening seven years were devoted assiduously to the advancement of astronomical and related sciences and to public service. Shortly before his death appeared his "History of the Cape Observatory," a record of remarkable achievement which all astronomers should read.

Sir David Gill made for himself a place in the front rank of astronomers.

This biography would be seriously lacking if it failed to mention Lady Gill. It was with her approval that the change from a lucrative business to the small income of an astronomical position was made in 1872. Her assistance and encouragement were invaluable on the expedition to Ascension, and to Gill's life of twenty-eight years at the Cape of Good Hope.

W. W. Campbell.

ABNER CHENEY GOODELL (1831–1914)

Fellow in Class III, Section 3, 1891.

Abner Cheney Goodell was born in Cambridgeport on the first of October, 1831. While he was yet a mere child his father moved to Salem and it was in the public schools of this latter place that Goodell received his education. In the High School he came in competition with the brothers William G. and Joseph H. Choate and it is said that he led the class in scholarship.

After leaving School, he began his life in the outer world in his father's machine shop but an opportunity soon offered him to read law in the office of an Uncle practising in Ipswich of which he availed himself. Following that up he concluded his studies in a Salem office and was admitted to the bar in 1852.

He began the practice of Law in Lynn, where he had an office for about five years. In 1856 he was appointed Register of the Court of Insolvency in Essex County and in 1858 he became Register of the joint Courts of Probate and Insolvency, and for twenty years thereafter was annually reelected to that office. He served the city of Salem in the year 1865 as alderman. He became President of the Salem and South Danvers Street Railroad in 1865, an office which he retained until 1884. He took over a bankrupt road and delivered to his successor a valuable paying property. He was appointed in 1865 one of a commission to prepare for publication copies of the Province Laws and Resolves. This board performed its work and was succeeded in 1867 by a commission appointed to supervise the publication of the Laws. Of this body he was also a member. The second commission remained in power until 1890, when a new board was appointed of which he also was one. This latter commission was superceded in 1896, at which time the work of supervising the publication of the Laws was lodged in the hands of the Governor and Council.

In 1879, he assumed the editorship of the publication of the Laws. Up to that time he had received no pay for his services on the commission. Thence forward, so long as he was connected with the work, he practically gave all his time to it, and received in return a meagre and inadequate salary.

He was President of the New England Historic Genealogical Society from January 1887 until June 1892. He was a member of the Massachusetts Historical Society, of the Colonial Society of Massa-

chusetts, and a fellow of the American Academy of Arts and Sciences. He was awarded the honorary degree of Master of Arts by Amherst College, and was elected an honorary member of the Harvard Chapter of the Φ B K. He was a Corresponding Member of the New York, New Hampshire, Maine and Rhode Island Historical Societies.

During a period of about thirty years Mr. Goodell was connected with the publication of the Province Laws and for seventeen years he filled the office and actually performed the functions of Editor. It was in deference to his ideas that the system of annotation was adopted which prevails throughout the five volumes of the public Laws. It was his purpose to furnish material illustrative of the conditions in the community which caused the legislation to which the notes were appended. In the search for material of this character, he ransacked the Archives, searched the records of the Courts, examined contemporary publications and caused similar searches and examinations to be instituted at the Records Office in England. His interest in the work, great at all times, increased with its progress. His care and attention were directed not only towards the faithful reproduction of all this contributory material, but he also developed a corps of assistants whose work was characterized by phenomenal accuracy. He may be said to have become thoroughly identified with the work and upon its reputation among future students will depend his fame. It is quite certain that the careful study by way of preparation of these notes made him unquestionably the best informed man in Massachusetts on the customs and modes of life during the days of the province.

Mr. Goodell's connection with the publication of the Province Laws was abruptly severed in 1896. This was brought about by impatience at delays in bringing forth the volumes, delays which were caused by his desire for completeness and accuracy. Even before the work was finally stopped, he was compelled to abandon his system of annotation and to revert to that set forth in the original resolution, marginal references. The methods by which the publication was closed were of a nature to leave ill-will between the parties concerned. Nevertheless, three years thereafter, when the renewal of the publication was under consideration, the Governor and Council consented to the tender of the Editorship to Mr. Goodell. He declined however to accept the position.

He was married in 1866, and when he died he left surviving him, a widow and two sons. His house was always open to his friends and here surrounded by the attentions of a devoted family, he passed

the later days of his life. Those who were able to profit by his hospitality dwell upon his genial manners and the great power and interest of his conversational faculties.

The attention of the Academy is of necessity concentrated upon his historical research in connection with the Province Laws. It is upon the character and value of that work that his fame must rest. While we can not at present predict with certainty what the verdict of posterity will be, we have at any rate at our command the profound respect with which students today treat these annotations, upon which we may predicate an opinion as to what is impending in the future.

For the details given of Mr. Goodell's Salem life, this sketch is indebted to a Memoir published in the Bulletin of the Essex Institute, to which one may turn for fuller details concerning this portion of his life.

ANDREW MCFARLAND DAVIS.

JOHN CHIPMAN GRAY (1839–1915)

Fellow in Class III, Section 1, 1878, Vice-President, 1902–1912.

John Chipman Gray, long Fellow and for several years Vice-President of the Academy, was born in Brighton, July 14, 1839; received from Harvard University the degrees of A.B. in 1859, LL.B. in 1861, and A.M. in 1862; served in the army of the United States, 1862–65; practised law in Boston 1865–1915; and was lecturer and Professor in the Harvard Law School continuously, excepting two years before 1875, from 1869 until his resignation in 1913; died February 25, 1915. He received the honorary degree of LL.D. from Yale and Harvard. He had been President of the Harvard Alumni Association, of the Harvard chapter of Phi Beta Kappa, and of the Boston Bar Association, and a member of the Massachusetts Historical Society. He was a legal author of eminence, his principal works being Restraints on Alienation (1883, 1895), The Rule against Perpetuities (1886, 1906, 1915), The Nature and Sources of the Law (1909).

Professor Gray was a virile man, mentally and physically, one in whom wisdom, judgment, and probity were joined with illuminated

common sense. A distinguished and productive student and teacher, whose influence was profound upon forty classes of students, he was also a lawyer whose counsel was sought by clients of all sorts, and was desired and found acceptable by the courts. He was not merely a learned lawyer; he was besides a graceful as well as forceful writer, a classical scholar of no mean attainments, a man of ready wit, and an administrator of large affairs. To his friends and associates he was, in Dean Thayer's noble phrase, "a rock of trust."

In him the Academy has lost a useful and faithful Fellow and a wise counsellor.

J. H. Beale.

HENRY WILLIAMSON HAYNES (1831–1912)

Fellow in Class III, Section 2, 1880, Librarian, 1886–1899.

Henry Williamson Haynes was born in Bangor, Maine, September 20, 1831, the only son of Nathaniel and Caroline Jemima (Williamson) Haynes. He attended the Boston Latin School and was graduated from Harvard College with the class of 1851. He taught for one or two years, then studied law, and was admitted to the bar in Boston on September 28, 1856. In 1867 he was made Professor of Greek and Latin in the University of Vermont, and in 1869 Librarian of the same institution, positions which he held until 1873. From that year until his death on February 18, 1912, he made his home in Boston, though he several times spent many months in travel abroad. He was elected to membership in the Academy October 13, 1880. On May 25, 1886, he was chosen Librarian, an office which he held until 1899.

The most striking characteristic of Professor Haynes was the breadth of his intellectual interests. Always a lover of literature, especially of the literatures of Greece and Rome, he early interested himself in natural history, in archaeology, and in anthropology, and was one of the first Americans to devote himself to the study of prehistoric monuments. The papers and notes which he contributed to many different journals cover an unusually wide field, ranging all the way from comments on Latin mottoes and literary and historical notes of many kinds to discussions of palaeolithic implements and

aboriginal fire-making. He was an indefatigable collector and brought together a valuable library and an important collection of archaeological material, which he bequeathed to Harvard University, the Museum of Fine Arts, and the Boston Society of Natural History.

A comparatively full account of his life, with a list of his published writings, was printed in the *American Anthropologist*, Vol. XV, 1913, pp. 336–346.

G. H. CHASE.

GEORGE WILLIAM HILL (1838–1914)

Fellow in Class I, Section 1, 1865.

Hill's work on the lunar theory justly entitles him to a permanent and important place in the history of celestial mechanics. In his two papers, "Researches in the Lunar Theory," and "The Motion of the Perigee of the Moon," he made contributions which have already created a fundamental change in the methods of viewing the problem of three bodies. In the first of these papers he outlined a plan for dealing with the lunar theory as a practical problem and worked out the first approximation. In the second paper the chief difficulty of the second approximation is solved in a manner which shows Hill's high capacity for algebraic analysis. This method, though based on one by Euler, was given a form which was capable of development into a complete theory. But to most students of the subject of celestial mechanics his initiation of the idea of the periodic orbit in the former of these papers is his greatest achievement. The great work of Poincaré which has pointed out new regions of research is based mainly on this idea, and many others have followed in his footsteps. Another feature of the memoir is the stress laid on the zero velocity curve from which we may hope in the future to have some more exact ideas as to the stability of planetary and satellite systems.

Ten years of his life were spent in constructing theories of the motions of Jupiter and Saturn, and in forming tables for the prediction of the positions of those bodies. This work, although laborious and carried out with great care and accuracy, contains little that is new. Hansen's method is used with almost no change. In spite of the success which attended his labors one cannot help a feeling of regret

that Hill, with his genius and originality, should have spent the best years of his life on computations which could have been carried through by others if the necessary delay in training them for the work had been granted.

Hill published a number of other papers on a variety of astronomical subjects, many of them worthy of careful study for Hill always put the impress of his own mind into his memoirs, even when developing the ideas of his predecessors. The Carnegie Institution of Washington has published Hill's memoirs in four large quarto volumes.

For practically the whole of his life Hill was a member of the staff of the Nautical Almanac office, doing his work as far as possible at his home in West Nyack, N. Y. He cared little for money or luxuries, and resigned his post as soon as he had completed the tables of Jupiter and Saturn. He was essentially a man who lived for the development of his own ideas and who cared little for contact with his fellow men. Nevertheless those who knew him well, and were in the habit of accompanying him on the walks or trips which he frequently took in the country, always speak of the pleasure of his companionship. But few people knew him personally, and his life was so uneventful that the biographer finds little to record, yet his name will live after those of most of his generation are forgotten.

He was born in New York City on March 3, 1838, and died at his home in West Nyack, N. Y., on April 16, 1914.

E. W. Brown.

EDWARD SINGLETON HOLDEN (1846–1914)

Fellow in Class I, Section 1, 1885.

Edward Singleton Holden was born in St. Louis, Missouri, on November 5, 1846. He was a student in Washington University, St. Louis, in the years 1862–66, and was graduated in the latter year with the B. S. degree. William Chauvenet, author of the well known "Manual of Spherical and Practical Astronomy," was Chancellor of, and Professor of Mathematics and Astronomy in, Washington University during that period. It is probable that Mr. Holden pursued astronomical studies with Professor Chauvenet, but his interest in astronomical subjects had been aroused on the occasions of visits to

Harvard College Observatory while his cousin, Professor George P. Bond, was director of that institution (1859–65). Mr. Holden married Professor Chauvenet's daughter Mary in the year 1871.

During the years 1866–70 Mr. Holden was a cadet in the U. S. Military Academy at West Point, graduating in the latter year. He ranked third in his class. In 1870–71 he was Second Lieutenant in the Fourth U. S. Artillary, in the following year Instructor in Natural Philosophy in the Military Academy, and in 1872–73 Instructor in Practical Military Engineering. In 1872 he published an octavo treatise on "The Bastion System of Fortifications, Its Defects and Their Remedies."

In March, 1873, Lieutenant Holden resigned his commission in the army to accept appointment as Professor of Mathematics in the U. S. Navy, for service as astronomer in the U. S. Naval Observatory at Washington. There he came at once into close personal relations with Simon Newcomb, serving as assistant to Newcomb with the just completed 26-inch Clark refracting telescope. It is clear from historical developments, as well as from passages in Newcomb's "The Reminiscences of an Astronomer," that Newcomb was tremendously impressed with Holden's energy and ability. When Mr. D. O. Mills, President of James Lick's first Board of Trustees, went to Washington in 1874 to consult with Newcomb concerning plans for the projected Lick Observatory, Newcomb "suggested that a director of the new establishment should be chosen in advance of beginning active work, o that everything should be done under his supervision. As such director I suggested that very likely Professor Holden, then my assistant on the great equatorial, might be well qualified."

It is an illuminating comment upon Professor Holden's promise as an astronomer of the future that he should be recommended, and I think tentatively selected, as the director of the proposed Lick Observatory, to contain the largest and most powerful telescope in existence, at a time when his astronomical experience had covered little more than one year. Professor Holden was then less than twenty-eight years of age.

Professor Holden went to London in 1876 as a delegate from the U. S. Government to examine and report upon the South Kensington Loan Collection of Scientific Instruments, especially as to improvements in the astronomical and geodetical instruments.

While on the staff of the Naval Observatory, Professor Holden made himself very familiar with the literature of astronomy; he

observed comets, nebulae, satellites and double stars; he prepared and published bibliographies relating to nebulae and star clusters, to the transits of Mercury, and to other subjects; he prepared annual reports on the progress of astronomy; he published a critical description of the 26-inch refracting telescope, a monograph on the Nebula of Orion, a volume on The Life and Works of Sir William Herschel, and, in collaboration with Professor Newcomb, a textbook on astronomy.

Professor Holden was in charge of an expedition dispatched by the Naval Observatory to observe the total solar eclipse of July, 1878, at Central City, Colorado.

In 1881 Professor Holden resigned his commission in the navy and accepted the directorship of the Washburn Observatory, University of Wisconsin. This position he held during the years 1881–85. At Madison he organized and pushed the observational work of the Washburn Observatory with vigor.

Professor Holden was in charge of the expedition sent by the National Academy of Sciences to observe the total solar eclipse of May, 1883, in the Caroline Islands, where he was assisted by four young astronomers whose names later became well known: C. S. Hastings, E. D. Preston, S. J. Brown and Winslow Upton. An extensive program was carried through successfully. The volume containing the observational results is a model in form, and is frequently referred to by eclipse observers.

In 1885 Professor Holden was appointed President of the University of California and Director of the Lick Observatory, to serve in the former capacity until the Observatory should be completed, and thereafter in the latter capacity. He assumed the active directorship of the Lick Observatory on June 1, 1888. Professor Holden was consulted extensively by the Lick Trustees, beginning with 1874, and during the last three years of the construction period he was intimately associated with the Trustees as adviser.

Professor Holden's term of office as the first Director of the Lick Observatory terminated by resignation on December 31, 1897.

An astronomer has said that "the first requisite for the director of a great observatory is to have a very clear notion of just what kind of work ought to be done, how it should be done, and then to give all the aid in his power to the investigator." Director Holden selected the most promising men he could find in the United States to comprise the Observatory staff. He assigned them definitely to lines of research which the succeeding years have shown to be of the highest importance. He gave them such opportunities to succeed as no other astronomers

had ever enjoyed. In particular, he gave them great liberty of action. To quote from Newcomb's "Reminiscences," page 190: "The institution made its mark almost from the beginning. I know of no example in the world in which young men, most of whom were beginners, attained such success as did those whom Holden collected around him."

The evidences of Professor Holden's organizing ability and energy are written all over the Lick Observatory. His own scientific work in the Lick Observatory related principally to the photography of the Moon, but the administrative duties did not leave him much time for personal research. The last years of his administration were marred by the existence of animosities in the observatory community, and by much ill-advised criticism in the newspapers. The time has not come for any member of the staff in Professor Holden's administration to attempt a published discussion of the subject.

From November 1901 until the time of his death, Professor Holden was Librarian of the U. S. Military Academy. In this position he was extremely successful.

Many distinguished honors were conferred upon Professor Holden. He was elected Foreign Associate of the Royal Astronomical Society in 1884; a member of the National Academy of Sciences in 1885; and later to membership in the Astronomical Society of France, in the Italian Spectroscopic Society, in the American Academy of Arts and Sciences, etc. He received the degree of LL.D. from the University of Wisconsin in 1886, and from Columbia University in 1887; the degree of Sc.D. from the University of the Pacific in 1896; and the degree of Litt.D. from Fordham College in 1910.

Professor Holden's interests took a wide range. He has published: on the bastion system of fortifications; on studies in Central American picture writing; "The Mogul Emperors of Hindustan," a delightful volume, dated 1895; "Mountain Observatories" (1896); "Pacific Coast Earthquakes" (1898) the "Centennial History of the U. S. Military Academy, 1802–1902"; and several other volumes, as well as many popular and semi-popular magazine articles.

Professor Holden died at West Point on March 16, 1914, where he was buried with military honors. The event marked the passing of a remarkably able and interesting man.

W. W. CAMPBELL.

SAMUEL WILLIAM JOHNSON (1830–1909).

Fellow in Class I, Section 3, 1871.

Samuel William Johnson was born in Kingsboro, New York, July 3, 1830, and died at his home in New Haven on July 21, 1909. He entered the Sheffield Scientific School of Yale University as an advanced student of chemistry in 1850; later studying abroad under such masters as Erdmann, Liebig, Pettenkofer, and Von Kobel. In 1856 he began his career as Professor of Chemistry in the Sheffield Scientific School, teaching Analytical, Agricultural and Theoretical Chemistry, in all of which he displayed that clear and concise knowledge which makes the great teacher. It was, however, in the field of agricultural science that his greatest interest lay, and it was mainly through his efforts that the State of Connecticut gained the honor of inaugurating in this country the work of Agricultural Experiment Stations, which are now in successful operation in every State of the Union. The Connecticut Station, founded through his efforts, served for many years under his management as a striking illustration of the many ways in which chemical science can give aid to practical agriculture. In 1868 he published a book, "How Crops Grow," which attracted wide attention, and in 1870 this was followed by another volume, "How Crops Feed." They were the first books printed in this country bringing together in related form such knowledge as then existed regarding the composition and physiology of plants. In reality they furnished a new basis for instruction in agriculture, and that their worth was clearly recognized is shown by the fact that they were translated into German, Russian, Swedish, and Japanese, and the former book into French and Italian also.

In analytical chemistry, between the years 1864 and 1883, he edited three editions of Fresenius' Manual of Qualitative Chemical Analysis. Also, in 1870, he edited Fresenius' System of Instruction in Quantitative Analysis. His writings on chemical subjects were numerous, he being for more than fifty years a constant contributor to agricultural and scientific journals.

As the writer has stated in another connection, Professor Johnson's broad and keen grasp of chemical problems, added to his farsighted appreciation of the many advantages to be gained by a judicious application of the science of chemistry to agriculture, made him a power in his generation, and his services counted for much in the

development of agricultural chemistry. Further, in the early years of the Sheffield Scientific School he was a pillar of strength, an example of the highest type of productive scholar, and a forceful illustration of the power which a scientific man can wield for the good of the community. The life of Samuel William Johnson and the work he accomplished constitute a suggestive example of a form of high public service which the man of scientific training can render his country and humanity.

RUSSELL H. CHITTENDEN.

WILLIAM THOMSON, LORD KELVIN (1824–1907)

Foreign Honorary Member in Class I, Section 4, 1872.

William Thomson was born in Belfast, Ireland, on June 26th, 1824. He was knighted in 1866 and was raised to the peerage in 1892 with the title of Baron Kelvin of Largs. His ancestors had migrated from Scotland in the seventeenth century. His father, James Thomson, removed from Belfast with his family to Glasgow, Scotland in 1832 to occupy the chair of Mathematics at Glasgow University. William matriculated at that institution in 1834, being then a little over ten years old. He was a precocious boy, rapidly advancing in his studies and early giving promise of that great mathematical genius and grasp of scientific problems, which especially characterized his later life. At sixteen he had, as a voluntary task, mastered Fourier's methods and theorems in the original French, this study occupying a fortnight only. He graduated from Cambridge University in 1845 taking rank as second wrangler, and shortly afterwards became Smith's Prizeman. Many evidences of his special talents were shown during his student years at Cambridge, in papers and discussions.

Leaving Cambridge he studied in Paris and there came into contact with such leaders as Pouillet, Regnault, Liouville, Biot, Cauchy, Foucalt, Dumas, Pelouze and others.

In 1845 he was granted a Fellowship with rooms at Cambridge. He had early shown a deep interest in electrical problems and theories, in which field he afterward found opportunity to do his most important work. This interest brought him into contact with Faraday. The

so called Kerr effect, which on Thomson's suggestion was sought for unsuccessfully by Faraday was not actually discovered till 1876.

In 1846 Thomson, then only 22, was appointed to the Chair of Natural Philosophy in the University of Glasgow. This position he held for fifty years. There now began a most active period of his life and many of his students afterward became noted in physical science.

Thomson's studies covered the widest range including Kinematics and Thermodynamics. Important discoveries, such as the Thomson thermoelectric effect were made, and inventions of the greatest scientific and technical value worked out. Among these latter may be mentioned the famous mirror galvanometer, of exceeding sensibility and almost essential to ocean telegraphy. There was also the well known water dropper leading to the so called Mouse Mill Replenisher. His great invention of the siphon recorder for cable telegraphy was made in 1869, and later his improved deep sea sounding apparatus and his mariner's compass improvements, aided greatly the art of navigation, in which he had always possessed a keen interest. The briefest record of his great activity in various fields is permissible here.

In 1851, elected to the Royal Society, his papers on Thermodynamics brought him into contact with Helmholtz, Joule and later Clerk Maxwell. It happened that a few years prior to 1858, Thomson had made a study of the conditions of transmission of signals in long submarine cables, using the Fourier mathematics to determine the factors of retardation, etc. In 1858 the first Atlantic Cable was laid, and for a time it was successful; failing after several hundred messages had been transmitted. Such success as there was must be attributed to Thomson, and the failure was probably caused by faults of insulation made worse by allowing the cable to be manipulated at high voltages and under conditions directly at variance with Thomson's ideas and disapproved by him.

The great treatise by Thomson and Tait on Natural Philosophy was projected about this time. Part I however was not published until 1879 and Part II not until 1883. The authors thereafter abandoned the publication of the originally contemplated two additional volumes.

Following the London International Exhibition, Thomson took an active part in the committee work in 1862 involving the establishment of values and names for the international electrical units, such as the ohm, the volt and the farad. This pioneer work has been continued at the later international congresses and conferences, several of which he attended.

The task of again laying an Atlantic Cable was taken up in 1865 with Thomson as the responsible electrical head. As is well known the 1865 cable broke in mid-ocean necessitating a new cable. This was laid in 1866 under Thomson's careful supervision aboard ship, and with constant tests as to the integrity of the cable being paid out. The result was completely successful and was at once followed by the picking up at sea, the splicing and completion of the broken 1865 cable; thus rendering available two cables instead of one. It was characteristic that Thomson had previously renounced any claim for time or services or even expenses, unless success was obtained. It was this success which earned him his Knighthood. His attention had not, however, been turned away from his purely scientific work. His papers on the age of the sun's heat and on the secular cooling of the Earth, brought on the famous controversy with the naturalists, principally the biologists and geologists; a controversy which was continued until at last the discovery of radio-activity had introduced new, and before unknown, factors, which had not entered into his calculations, and which virtually destroyed their applicability to the case. His studies on the rigidity of the Earth did much to negative the old assumption of a fluid interior supporting a solid crust. His papers dealing with his vortex theory of atoms, and papers and addresses on the ether of space were not the less noteworthy, though the views advanced he later renounced. In spite of his firm belief in the doctrines of creation and design in nature, he was not prevented from suggesting that the first germs of life on the earth might have been brought by a meteor from the outside. His practical judgment caused him to realize at once the great value of Bell's telephone in 1876, he being a first witness of its performance at the Centennial Exhibition. His appreciation of the future great service to be expected from the larger electrical applications was another evidence of his exceptional practical insight. This is exemplified in a strikingly prophetic statement made by him on Jan. 22, 1878, before the Institution of Civil Engineers of Great Britain.

Later Sir William Thomson contributed markedly to the art of exact electrical measurements in large work by his inventions of electrostatic voltmeters and particularly by his electrodynamic balances, now known as Kelvin balances. He was author of the article on Electricity and also the four principal sections on Heat in the ninth edition of the Encyclopoedia Brittanica.

Among many subjects investigated mathematically and experimentally by him were gyrostatics and wave motions, on which he became an authority.

Sir William was raised to the peerage in 1892 and was afterward known as Lord Kelvin. His retirement from his professorship in the University took place in 1896 and was the occasion of a jubilee in his honor after fifty years of service. In this celebration many of the foremost scientific men of the time took part.

He died Dec. 17, 1907, and his remains now rest in Westminster Abbey, next to the grave of Isaac Newton. A memorial window was later placed in the Abbey in commemoration of his life and work. He was twice married, but there were no children. In him were united the greatest gifts, a mathematical ability of the highest order, a deep scientific interest, an originality and industry most exceptional, and a personality most modest and attractive. His great talents were exercised not only in pure science, but were brought to bear with equal fruitfulness on difficult practical problems, and led to the conception and development by him of many valuable inventions, to some of which allusion has been made in the foregoing brief account of his life.

ELIHU THOMSON.

HENRY CHARLES LEA (1825–1909)

Fellow in Class III, Section 3, 1870.

Henry Charles Lea, son of Isaac Lea and grandson of Mathew Carey, was born in Philadelphia in 1825 and died there 24 October 1909. Of precocious ability, he was educated at home and by private tutors, and at the age of eighteen entered his father's publishing house, with which he remained actively connected until 1880. He took an active part in the business and political life of his city and in public matters generally, but his dominant interests were those of a scholar and man of letters, manifested first in literary and scientific studies printed in his early youth, and later in the monumental series of books on mediaeval law and ecclesiastical history and institutions which began to flow from his pen in 1866. The eighteen solid volumes of his published works of history comprise: "Superstition and Force" (1866, fourth edition, 1892); "History of Sacerdotal Celibacy" (1867, enlarged edition, 1907); "Studies in Church History" (1869); "History of the Inquisition of the Middle Ages" (1888; also in a

German and a French edition); "Chapters from the Religious History of Spain" (1890); "A Formulary of the Papal Penitentiary" (1892); "A History of Auricular Confession and Indulgences in the Latin Church" (1896); "The Moriscoes of Spain" (1901); "A History of the Inquisition of Spain" (1906–1907, also translated into German); "The Inquisition in the Spanish Dependencies" (1908).

Taken as a whole, Lea's works represent the most considerable contribution made to European history by an American scholar. His interest in the past was institutional and scientific, rather than biographical or dramatic, so that his writings lacked the element of popular appeal and were more widely read and more highly valued in Europe than in the United States. He dealt with highly controversial subjects, and not all his conclusions have won universal assent, but he commanded general respect for his candor and judgment, his untiring industry, and the extraordinary range, depth, and solidity of his learning.

Biographical and critical accounts have been printed in the Proceedings of the American Philosophical Society, L (1911), and the Proceedings of the Massachusetts Historical Society, XLIII, 183–188.

CHARLES H. HASKINS.

FRANCIS CABOT LOWELL (1855–1911)

Fellow in Class III, Section 1, 1898.

Judge Francis Cabot Lowell was born in Boston on January 7, 1855, son of George Gardner Lowell, and grandson of the member of this Academy for whom he was named. In boyhood he showed some of the qualities which distinguished him in later life, for in physical size and intellectual grasp he developed early. To friends of his youth he seemed colossal in both, and the extent of his memory appeared well-nigh prodigious. He was easily at the head of his class, and Mr. Noble, the headmaster of the school, said many years later that he thought him on the whole the best scholar he had ever had. His interest in politics and his knowledge of public events, began at a very tender age, and he discussed these things while he was scarcely out of the nursery. When hardly more than twelve years old the

struggle between President Johnson and Charles Sumner so fixed his attention that he formed an ambition to be some day a Senator of the United States — a youthful dream that might well have been gratified had he not accepted a seat on the bench. Most normal boys have visions of holding great places in the world, and this one would not be worth recalling were it not that it showed already a sense of reality, a capacity for observing political facts, rare at that age. In later years he maintained that, at the time of Johnson's administration, he was quite justified in thinking an influential Senator more important than the President.

In boyhood he was so large as to outgrow to some extent his strength, and although he rode a horse, fished, and sailed a boat well,— and indeed was an excellent boatman throughout his life,— he took little part in the rougher competitive sports, such as baseball and football, which throw boys together.

In 1872 he passed the examinations for admission to Harvard College with honors in every subject in which honors could be obtained; but on account of his health, which was believed to be delicate, he did not go to Cambridge until the next year when he joined his class as a sophomore. While he never complained of his fortune at any period of his life, he always had a feeling that this delay at the outset did not give him a quite fair start in his college career. In fact, it was a couple of years before his classmates appreciated his merit and his force; but in time these were recognized and in his senior year he was chosen to preside at the meeting called for the discordant business of choosing class officers. In scholarship he naturally ranked high, graduating with honors in History, and the confidence of the authorities in his ability was shown by his being selected to fill a sudden vacancy in writing a Commencement Part with only a few days' notice.

After graduating he spent a year in travel over Europe, returning to enter the Law School, where he was from the outset one of the leading men. The beginning of active life in the world was not wholly promising, for he had not the push or the good luck to attract business. He was for eighteen years in practice at the bar, first with the writer of this memoir, and later with Frederic J. Stimson also, who joined the firm in 1891. In all the intercourse of the office he was the most considerate, generous and wise of partners; but the clients were not numerous, and in fact the amount of work was neither exacting nor highly remunerative. He was not, however, discouraged, for he had within himself other resources. In the early years of practice the

two partners wrote a book on "The Transfer of Stock in Corporations," but thereafter his spare time was turned into other channels, three leading interests, outside of office work, commanding his attention, History, Harvard University, and Politics. History he had always cared for, and the quality of his mind, his powerful memory, and his judicial temper fitted him peculiarly to pursue it. He had studied it much in College, and became fascinated by the life of the Maid of Orleans. To gathering everything published about her life and times he devoted much labor for several years, and then wrote his "Joan of Arc." Towards the end of his life he was again at work on history, but did not live to write what he had planned.

Harvard had always been very dear to him. He felt for the University the affection that comes from an inheritance of generations, and from associations beginning in childhood, as well as from spending five years within its walls. In 1886 he was elected an Overseer and, except for one year, he sat on the Board until he was chosen in 1895 a member of the Corporation, an office he retained until his death in 1911. The University has had few members of its Governing Boards who worked harder, none more constant in interest than he.

The third avocation, if one may call it so, was politics — a revival, or since it was never lost, a fruition of the interest of boyhood. His attitude toward public life was exactly what one would like to see. His leading motive was neither personal ambition, nor a stern desire to fulfill a disagreeable duty. He enjoyed each position he filled, and looked forward to a more important one without grave disappointment when he failed to get it. He did his duty diligently, faithfully, and with pleasure, a stranger alike to the passionate eagerness of the reformer and the self-seeking of a more common type. He began modestly and dutifully in the Common Council of the City of Boston, did what he could for honest administration there from 1889 to 1891, and later went into the legislature. Here was a field better suited to his talents. His character commanded respect, his ability won confidence, and he became Chairman of the Committee on the Judiciary and the leading figure in the House. Some results of his observation of men and methods at the State House he embodied in an article on "Legislative Shortcomings" [3] full of a clear perception of actual facts unfortunately too rare in our political writings; a quality which appears also in another study on "The American Boss." [4] Published as these were only in the ephemeral pages of a periodical

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3 The *Atlantic Monthly*, March, 1897.
4 *Ibid.* Sept. 1900.

they have been lost from sight, and he never pursued the subject in a more permanent form.

His service in the House covered the three years from 1895 to 1897. How much farther he might have gone one cannot say, for in 1898 he was offered and accepted the position of Judge in the United States District Court for Massachusetts. Some of his friends saw that his political prospects were bright, and that by accepting an appointment to the bench he would renounce them; but he knew how uncertain they must be and felt that, with his practice at the bar no better than it stood, to refuse would mean to leave the law and to give up his profession altogether. For judicial work he was by intellect and temperament well adapted, and whatever he may have abandoned, the suitors and counsel in his court gained by his acceptance of the place. Promoted in 1905 to the Circuit Court, he spent on the federal bench the last thirteen years of his life. To the questions that came before him he brought the ability, the careful thoroughness, the large knowledge that he did to everything else he undertook, and it is notable that of his many decisions an unusually small proportion were over-ruled on appeal.

From childhood he had qualities that made his life a singularly useful and happy one. What he once said of the grandfather for whom he was named might have been said of him,— that he had weak appetites with a strong will — a rare and fortunate combination. He seemed to embody the Greek idea of temperance, the possession of all good tendencies in moderation and none of them in excess. His political attitude was typical. Early in life, before he became active in politics, he was, at the election of 1884, a Mugwump; but ever after he was a consistent Republican. He saw, and made no attempt to conceal, and scarcely to excuse, the faults of his own party, yet he adhered steadily to it in office and out. This was characteristic. Clear in perception, just in opinion, he was a partisan without blindness and almost without prejudice, and that from a naturally contented disposition. He liked the men and the things with which he was associated — felt kindly toward them and was happy with them. The serenity of his disposition never failed in public or in private life. Even during the last two years of growing weakness he worked to the utmost of his strength, enjoyed cruising in his boat in the waters of Vineyard Sound and Narragansett Bay that he loved so well and never in sickness or in health, in success or in disappointment, did he show the fretfulness that is the blight of modern life.

A. Lawrence Lowell.

FREDERIC WILLIAM MAITLAND (1850–1906).

Foreign Honorary Member in Class III, Section 1, 1897.

Frederic William Maitland was born in London 28 May 1850 and died at Las Palmas, Canaries, 19 December 1906. The grandson of Samuel R. Maitland, the historian of the "Dark Ages," he was educated at Eton and Trinity College, Cambridge, where he came under the influence of Henry Sidgwick and won high distinction in philosophy. He entered Lincoln's Inn in 1872 and was called to the bar in 1876. His interests, however, soon began to turn from the practice of law to its history, and in 1884 he was appointed Reader of English Law in the University of Cambridge, and in 1888 Downing Professor of the Laws of England, a chair which he held until his death. It is, however, characteristic of the English university system that the duties of his professorship consisted of general lectures to undergraduates on the elements of law rather than of the training of scholars in his special field, so that he formed no school of disciples who could develop or continue his work. His professorship, however, gave him considerable leisure for writing, and in spite of the ill health which soon drove him southward in the winter and finally cut him off in the fulness of his activity, he accomplished an astonishing amount of productive labor.

It is a curious fact that Maitland owed to a Russian historian, Paul Vinogradoff, his introduction to the original records of English legal history. The acquaintance ripened speedily into his first important publication, a roll of "Pleas of the Crown for the County of Gloucester" in 1884, followed in 1887 by "Bracton's Note-book." Then came "Select Pleas of the Crown" (1888); "Select Pleas in Manorial Courts" (1889); "Three Rolls of the King's Court, 1194–5" (1891); 'Records of the Parliament of 1305" (1893); "The Mirror of Justices" (1895); "Select Passages from Bracton and Azo" (1895); and the "Year Books of Edward II," as far as 1310 (1903–06). Merely as an editor of records and as the prime mover in inaugurating the publications of the Selden Society, he would hold a high place among those who have advanced the cause of English history. He shrank from no editorial labor, such as the difficult problems of the Law-French of the Year Books, but his introductions also show the wide learning, the luminous view, and the brilliant style which characterize all his writings. Besides these editions and a number of scattered

essays, most of which have been brought together into the three volumes of his "Collected Papers," his most important works are "Domesday Book and Beyond" (1897); "Township and Borough" (1898); "Roman Canon Law in the Church of England" (1898); a translation of Gierke's "Political Theories of the Middle Ages" (1900); a brilliant lecture on "English Law and the Renaissance" (1901); a posthumous set of lectures on "The Constitutional History of England" (1908); and the classic "History of English Law before the Time of Edward I" (1895), published conjointly with Sir Frederick Pollock but chiefly the work of Maitland. His last weeks in Cambridge were given to the "Life and Letters of Leslie Stephen." A full bibliography of his writings is appended to A. L. Smith's "Frederic William Maitland" (Oxford, 1908), where many characteristic passages are quoted. A biography, with a number of letters illustrating his style and the charm of his personality, has been published by Herbert Fisher (Cambridge, 1910).

As an historian of English law Maitland has never been equalled. He was a finished jurist without the lawyer's reverence for form and authority; he combined the philosopher's power of analysis with the faculty of seeing everything in the concrete; and he had the delicate sense of evidence, the flashing insight, the vivid imagination, and the human sympathy of the great historian. To him the history of law was the history, not of forms, but of ideas; through it "the thoughts of men in the past must once more become thinkable to us." Yet law is not something abstract: its records "come from life," as he said of the Year Books, and must return to life. "English law is English history," he wrote; yet, first of English scholars, he saw it clearly against its Continental background. Unlike many jurists, however, he did not seek to reduce the manifold complexities of life to a few general principles and to clarify what had never been clear; he avoided too definite conclusions and rather let his mind play about a subject in all its variety and illuminate it from different angles. To a masterly gift of exposition and a talent for apt illustration he joined a marvellous style, pointed, witty, epigrammatic, lighting up the dullest and most technical subject, and adorning everything it touched. Confining himself to the history of institutions and ideas, he did not enter the field of the narrative historian, so that the absence of a common standard renders comparisons difficult; but the quality of his mind justifies Lord Acton's judgment that he was "the ablest historian in England."

CHARLES H. HASKINS.

BENNETT HUBBARD NASH (1834–1906)

Fellow in Class III, Section 2, 1876.

Bennett Hubbard Nash was born at Bloomingdale, now a part of New York City, July 6, 1834, the son of Joshua and Pauline (Tucker) Nash, and died at Little Boar's Head, New Hampshire, July 20, 1906. His early education was received in Europe. It is perhaps an indication of the seriousness of his character even in boyhood that he joined the Waldensian Church at the age of fourteen in Turin. A younger brother was born at Florence, Italy, in 1836, and both brothers were members of the class of 1856 in Harvard College, and both attained high rank, being among the first ten scholars of that class at graduation, and, while neither seems at that time to have contemplated adopting the profession of teaching, both later became college professors. Bennett entered Andover Theological Seminary in 1856 and was graduated in 1860. In the spring of that year he had been licensed to preach, and in the next few years he did occasionally preach in Boston and elsewhere. In 1866 he was appointed instructor in Italian and Spanish in Harvard College, and he became assistant professor in 1871 and professor in 1881, a position which he held till the summer of 1894, when his resignation, presented in December, 1893, took effect.

During the long period, broken by severe illness in the academic year 1872–73, which was covered by his college teaching his work was untiringly faithful and conscientious, and it is easy to understand that he carried the same faithfulness to duty in all details into everything that he undertook, particularly in his later years his management of the financial affairs of family connections. He was interested not only in languages and in literature, but also in music and other things, as is indicated by noticing the various organizations of which he was a member. Besides being a Fellow of this Academy he was connected with associations, clubs, and benevolent societies, including the American Philological Association, the Modern Language Association of America, the Dante Society, the American Dialect Society, the Bostonian Society, the Harvard Musical Association, the Apollo Club of Boston, the St. Botolph Club, the Colonial Club of Cambridge, the University Club of Boston.

He was married Feb. 19, 1861, in Boston to Mary Pratt Cooke (daughter of Josiah Parsons Cooke).

E. S. Sheldon.

JOHN ULRIC NEF (1862–1915)

Fellow in Class I, Section 3, 1891.

John Ulric Nef was born in Switzerland (Herisau) June 14, 1862, but came with his parents to the United States as a very young boy. He graduated from Harvard University in 1884, receiving the award of the Kirkland Traveling Fellowship, which gave him the opportunity to study chemistry at the University of Munich. In 1886 he received the degree of doctor of philosophy at Munich. His chief teacher was v. Baeyer and undoubtedly Baeyer's great work on unsaturated valences in carbon derivatives was decisive in leading Nef to make the study of the nature and activities of carbon valences his own life work. But he had the fine courage, the critical judgment and the tremendous capacity for ardent work — earmarks of his genius — to strike out on independent paths and develop his own lines of thought. This was shown already in his very first investigations (on the structure of benzoquinone), undertaken at Purdue University where he held his first chair in chemistry (1887–'89), and continued at Clark University ('89–'92). His fundamental researches on bivalent carbon (as proved particularly for the isocyanides and the fulminates) followed immediately after his work on the quinones; it was started during his stay at Clark University and completed at the University of Chicago, to which he was called in 1892 and where he remained, as head of the department of chemistry, until his death on August 13, 1915. This brilliant series of investigations brought to him immediate and widest recognition as a bold and successful thinker: he became a fellow of the American Academy of Arts and Sciences in 1891, a member of the National Academy of Sciences in 1904 and a member of the Royal Society of Sciences of Upsala, Sweden, in 1903. He received the honorary LL.D. degree from the University of Pittsburgh in 1915.

Dr. Nef applied the new line of thought, thus developed, to the study of the mechanism of many classes of reactions of organic compounds and he was engaged at the time of his death in an exhaustive investigation of the sugars from the point of view of bivalent carbon reactions. His ideas have been used and found stimulating and fruitful in the work of a great many other investigators and there is little doubt that his view of the existence of bivalent carbon in isocyanides, fulminates and similar derivatives is destined to form a permanent part of the theory of chemistry.

JULIUS STIEGLITZ.

SIMON NEWCOMB (1835–1909)

Fellow in Class I, Section 1, 1860.

Simon Newcomb may justly be compared with the great leaders of commerce and finance who have risen up during the past half-century, and who have had so large an influence on the development of American industry. That he was early drawn to astronomical science may be regarded as an accident of his career. As soon as he found himself in a position where his ideas could have free scope he set to work to condense and organize the cloud of facts and observations which was rapidly producing chaos in the astronomy of position. Different investigators were using different values for the fundamental constants of astronomy and the catalogues were affected by personal equations and instrumental errors; Newcomb sought to eliminate these and to combine observations from every source to produce values which would be generally accepted, or which could be made the basis for all future investigations. In this aim he was successful. Practically all investigations of the present day which lead to the determination of the constants of the star system, and to those of precession, nutation, aberration, etc., are compared with Newcomb's results and hence are comparable with one another.

This achieved, he set to work on a much longer task, that of producing new values and tables of the motions of the eight major planets of the solar system. He soon recognized that this was too large an undertaking for one man, even with a considerable force of computers at his disposal. For the most difficult portion, namely the theories of Jupiter and Saturn, he was fortunate in securing the services of the one man who had the requisite knowledge and ability to perform the task, G. W. Hill. All the rest of the work was carried on under Newcomb's supervision. When the construction of the theories from gravitation had been completed, he carried through a comparison of them with over sixty thousand meridian observations in order to determine with the highest possible accuracy the constants of their orbits. The tables embodying these results were then formed and are used in most of the national ephemerides.

The chief attraction to him, however, was the motion of the Moon. By comparisons with early occultations and eclipses for the records of which he ransacked many European libraries, he discovered the great fluctuation from its theoretical orbit which the Moon possesses and which is yet awaiting an explanation. From the modern occulta-

tions he showed that there were also minor differences concerning the origin of which we are equally in doubt. Although errors crept into both his theoretical and numerical work on this body it will always have great value for all students of the subject, if only on account of the great wealth of astronomical knowledge that Newcomb brought to bear on his discussions of its motion.

Newcomb was in the service of the Naval Observatory nearly all his life. From 1877 to 1897 he was director of the Nautical Almanac, and for eleven years of this period he was also professor of mathematics and astronomy at Johns Hopkins University, and editing the American Journal of Mathematics. He wrote many papers on economics of considerable value, and was interested in a variety of kindred subjects. His astronomical textbooks have had a wide circulation.

E. W. Brown.

ALFRED NOBLE (1844–1914)

Fellow in Class I, Section 4, 1913.

Alfred Noble, commonly referred to as the "Dean of American Engineers," was born on a Michigan farm on Aug. 7, 1844, and he died April 19, 1914. His fame as an engineer was not confined to the United States, for the Institution of Civil Engineers of Great Britain in 1911, elected him an Honorary Member of that body. During his long, honorable and active career in his own country, he had already received the highest honors from American engineering societies and in 1910 he was awarded the John Fritz medal for "Notable achievements as a Civil Engineer."

In his early life, he was known as a diligent student, modest, faithful and industrious. The work on his father's farm undoubtedly developed a sound physique which enabled him later in life to endure long and severe demands on his strength.

On Aug. 9, 1862, Noble enlisted in the Twenty-fourth Michigan Volunteers, later a part of Hooker's "Iron Brigade," and all through the war he was called upon to take an active part in the movements of the Army of the Potomac; he was never wounded but, like many of his companions, came very near falling a victim to disease. In June, 1865, he was mustered out of the service, at which time he had risen to the rank of Sergeant; then followed two years' service in the

Adjutant General's office in Washington and studies in preparation for a college course at Ann Arbor, which resulted in the degree of C. E. in 1870, a degree which brought honor alike to the recipient and to the College which bestowed it. Alfred Noble is always looked upon by the University of Michigan as one of its most distinguished sons.

On May 31, 1871, Mr. Noble married Miss Georgia Speechly, of Ann Arbor; then came long years of hard work in the profession of his adoption and the steady climb to positions of greater and greater responsibility. We may only glance at his successes in connection with the canal and lock at Sault St. Marie, the building of important bridges both in the East and in the West, and his opening of a private office in Chicago for carrying on a practice as Consulting Engineer.

It was at this time, 1894, that he became more widely known as an Engineer of remarkable ability and in many different lines of work. At the same time Noble was called upon to design hydraulic works of original nature in connection with the regulating works of the Chicago Drainage Canal, and to give advice in structural steel work of the most difficult character. He served on the Nicaragua Canal Board, the U. S. Deep Water Commission and in 1899 he became a member of the Isthmian Canal Commission. He visited Europe, he studied all the problems which were submitted to him with the greatest care and fidelity and his reputation widened so that he was called in every direction to give advice on the construction of work of the greatest magnitude, such as the Barge Canal of New York, the locks and dams at Panama, the Thebes bridge over the Mississippi, the extensions of the Pennsylvania R. R., with the difficult problems relating to the tunnels under the Hudson, the N. Y. Water Supply from the Catskills and many other important works in the United States and Canada. His resources never seemed to fail; they were the results of long years of close study and experience, united with remarkable natural gifts and a calm and placid disposition.

Alfred Noble's career was a fine example of the great engineer, with many specialities united in one practitioner. It is given to few in any profession to excel in many directions. In the early history of the country this was more often possible than at the present time, but a study of Alfred Noble's life and his wonderful achievements must convince a careful inquirer that, with a firm grasp of the fundamentals, and a wide practice in many branches, a splendid type of engineer is developed.

Mr. Noble was elected a member of the American Academy on January 8, 1913.

DESMOND FITZGERALD.

JOHN MORSE ORDWAY (1823–1909)

Fellow in Class I, Section 3, 1861.

John Morse Ordway was born at Amesbury, Mass., April 23, 1823. He was graduated from Dartmouth College in 1844, and immediately took up manufacturing chemistry, including a wide variety of materials. In 1869 he was appointed Professor of Metallurgy and Industrial Chemistry at the Massachusetts Institute of Technology, where he remained until 1884. During this period he not only showed great zeal and devotion in his work as a teacher, but continued his close association with the technical field. About 1871 he designed and constructed furnaces for assaying, smelting and refining metals, in which these operations could be carried on in the laboratories of the Institute upon such a scale as to be of practical value, this being the first time that such work had been introduced into any educational institution. He was much interested in the promotion of education of women in science, and in 1876 a special chemical laboratory for women was established at the Institute through his endeavors. He directed the work of this laboratory in addition to other duties.

He was elected an Associate Fellow of the Academy in 1861, was a member of the Council from 1878 to 1881, and a member of the Rumford Committee from 1871 to 1881.

In 1884 he accepted a professorship in Tulane University, and was also Professor of Biology in H. Sophie Newcomb College, which is a part of Tulane University, which position he held until a short time before his death in 1909.

He was an enthusiastic teacher, a stimulating lecturer, and a versatile worker, who both through his students and his varied researches contributed much to chemical science.

H. P. Talbot.

CYRUS GUERNSEY PRINGLE (1838–1911)

Fellow in Class II, Section 2, 1901.

Cyrus Guernsey Pringle, who won distinction as a botanical explorer, was born in East Charlotte, Vermont, May 6th, 1838, and died at Burlington, Vermont, May 25th, 1911. By descent he was of both Scotch and Puritan stock. His early years were spent in the simple and rugged conditions prevailing in small agricultural communities of northern Vermont in the middle of last century. Beyond a partial secondary schooling his education was self-acquired. He never had the advantage of collegiate training, yet in maturity he wrote well, in a finished, if somewhat formal, English, was familiar with the elements of Latin and Greek, and had a good command of Spanish, not to mention his technical knowledge of botany, plant-breeding, and horticulture. He was early associated with the Friends and, sympathizing deeply with their principles and faith, became a member of their Society.

In July, 1863, he and two other Friends from his community were drafted for service in the Federal Army. An uncle offered to pay the sum needful to secure a substitute, but this he refused, feeling that it would have been a concession to an abhorrent principle. Notwithstanding their firm remonstrance against taking any part in warfare, Pringle and his associates were taken to conscript camps first on Long Island in Boston Harbor and then to Culpepper, Virginia. They suffered many indignities even to bodily torture, were mild and kindly toward their tormentors, and yet remained absolutely fixed in their determination not to sacrifice their principles. Their case came to the attention of Stanton, the Secretary of War, and they were summoned to Washington, where they were treated with more consideration. At length, through the intervention of Isaac Newton, the Commissioner of Agriculture, their case was brought before Lincoln, who promptly ordered their release. A diary of more than 300 pages carefully kept by Pringle during these trying experiences not only possesses considerable historic significance regarding conscription of the period but is in itself a human document of high interest.[5]

During the next sixteen years Pringle's attention was largely devoted to the improvement of agricultural methods and especially

[5] See Atlantic Monthly, cxi. 145–162 (1913).

to experiments in plant-breeding. With natural aptitude, unlimited patience, and increasing skill, his achievements were notable, resulting in improved strains of wheat, oats, grapes, and potatoes. It has been estimated that these improvements effected by Pringle in crops of fundamental importance have together brought to the American farmers an increase of profit amounting to several millions of dollars. He was also greatly interested in horticulture and at one time cultivated a very large number of different species of Lilium and Iris, and experimented extensively in hybridization. He also turned his attention to certain practical aspects of plant-surgery and plant-pathology.

During all this time he acquired an increasing interest in the native flora of his region and, after making some admirably selected and carefully prepared collections in Northern Vermont, extended his explorations to the White Mountains and to the region of the lower St. Lawrence.

About 1880 an attack of inflammatory rheumatism warned him to seek occupation in a milder and drier climate. After consultation with Dr. Asa Gray, Prof. C. S. Sargent, and others, who recognizing his ability gave him aid, counsel, and several botanical commissions, he started on what became his special career and chief life-work, namely botanical exploration. His first journeys to California and Arizona were undertaken in a variety of interests — in connection with the forestry survey embodied in the United States Tenth Census, to secure wood samples for the American Museum of Natural History, and to obtain specimens and data helpful to Dr. Gray, then writing his Synoptical Flora of North America. Having accomplished notable results in all these directions, Pringle was encouraged by Dr. Gray to enter the more difficult field of Mexico. This he did in 1885 and from that time until the end of his life in 1911 he made more than twenty journeys to that country. He repeatedly penetrated its wildest regions, climbed lofty mountains, explored numberless cañons, traversed deserts, and cut his way through dense tropical jungles. Each year he brought back collections of astonishing extent and excellence.

The difficulties and perils of his travels were great. Without means to equip expeditions of size, in which safety may to some extent be effected by numbers and coöperation, he travelled with methods of Spartan simplicity, often alone, rarely with more than one assistant. The nature of his work took him into the most primitive regions, where neither the native food nor lodging was endurable, and in

consequence he frequently slept in the open and subsisted on the simplest kinds of food, which he could bring with him, as for instance crackers and Vermont cheese. He early suffered from tropical fevers, treated his disorders himself, sometimes with heroic doses of powerful medicines, and after a few years seems to have acquired a certain immunity from malarial diseases.

On these trips he took with him, one or two at a time, no less than thirty-one assistants. Nearly all of them suffered from fevers, and he nursed them tenderly and brought them all safely back to their homes. In selecting these assistants, he did not seek men of scientific attainments but chiefly husky young men from farms and lumber camps, who could help him in the manual labor of collecting and drying plants under his direction and especially in transporting heavy presses and other equipment often for many miles. Incidentally, it was in certain regions the duty of the assistant to carry somewhat obviously in his belt or hip-pocket a large cavalry revolver. This seems to have been strictly for moral effect, and so far as has been learned it was never employed otherwise. Indeed, there is a suspicion that it was not always loaded.

Happily, Pringle was able to establish exceedingly helpful relations of enduring friendship with several of the high officials in the government of Diaz. These gentlemen, some of them connected with the department of public health, were of great assistance in many ways, particularly in sending him from time to time telegraphic reports of the distribution of epidemic diseases in the republic, thus enabling him to avoid infected districts, a precaution of undoubted importance to which may have been due his success in escaping during a long series of years the more dangerous of the tropical diseases.

Pringle's first collecting in Mexico was in the northwestern states of Sonora and Chihuahua, a natural extension of his work previously done in Arizona. For some years thereafter he devoted his chief attention to the states of Nuevo Leon, Coahuila, and Jalisco, then to San Luis Potosi, particularly to the diversified and botanically rich southern extremity of that state, a region not penetrated by Schaffner, Parry & Palmer, or others who had previously done notable exploration farther north in the same state. From about 1890 Pringle devoted himself largely to southern Mexico, working with considerable thoroughness over Michoacan, the State of Mexico, the Federal District, Morelos and Puebla. Then with great enthusiasm he continued his labors in Oaxaca, "the garden state," most wonderful of all.

It is far easier to indicate the regions in Mexico where Pringle did not collect than where he did. In the following states he collected not at all or only to slight extent: Tamaulipas, the coastal portions of Vera Cruz, Tobasco, Campeachy, Yucatan, and Chiapas. His work extended to practically all the other states and most of them he explored repeatedly and with all feasible thoroughness.

He was very methodical in his work. At the outset he collected about forty specimens of each kind selected. Later, as his reputation increased and he was able to secure wider sales for his duplicates, he augmented this number to fifty and at length to sixty specimens of a kind. Returning to his home in Vermont after a season in the field, he would make up his sets, submit one complete set to specialists for expert determination, care for the printing of labels, and ship his duplicate sets to the numerous subscribers both in this country and to nearly all the important herbaria in other parts of the world.

Although earnestly devoted to his work, he was very humanly subject to a sort of rhythmic ebb and flow of enthusiasm. Each year in returning from his long and arduous journeyings, he would assure his friends that he could never return to Mexico, that he had exhausted the botany of the country so far as it was accessible to a man of his age and strength, that he believed he would devote himself to indoor work in his herbarium. After several winter months, devoted most happily to this indoor work, he would again become restless, would earnestly study the map of Mexico, and as soon as sufficient money returns accrued from the sales of his plants of the previous season, he would be off on his way back to Mexico with even more ambitious plans than any he had previously ventured upon.

It has been estimated by a close friend and excellent botanist that Pringle collected in all more than 500,000 specimens of plants, representing about 20,000 different species and varieties, of which about 12 per cent were new to science.

From 1898 until his death Pringle was the officially appointed Collector for the Gray Herbarium of Harvard University, and it has been at that establishment that the greater part of his remarkably interesting collections of plants have been identified and the numerous novelties have been given scientific study and publication, though in this work several specialists elsewhere, notably at the Department of Agriculture and United States National Museum, have given much expert aid.

From the beginning of his botanical work to the end of his life Pringle was greatly interested in developing his own herbarium and,

as he included in it an essentially complete series of his own extensive collections and added much material received by exchanges effected both in America and other parts of the world, both with professional botanists and amateurs, with museums, large herbaria, and with dealers, he gradually brought together a really notable herbarium, one of the best private botanical collections in any part of the world.

In 1902 the University of Vermont acquired this herbarium under conditions most happily arranged for the comfort of Pringle himself. Not only was the collection given the safe housing he had long desired for it in the substantial biological building of the institution, but he was appointed permanently its curator, with an appropriation for its care. Rarely does a man whose life has been spent in exploration attain a position so congenial and so considerately calculated to permit him in advancing years to organize and correlate the results of his life work.

From the University of Vermont Pringle received the honorary degrees, first of Master of Arts, and later of Doctor of Science.[6]

BENJAMIN LINCOLN ROBINSON.

CHARLES PICKERING PUTNAM (1844–1914)

Fellow in Class II, Section 4, 1912.

Charles Pickering Putnam, M.D.,— well known for many years as a practitioner of medicine, but perhaps more widely known, yet not more warmly remembered, as a devoted worker on the broadest possible lines of social service,— was born in Boston, September 15, 1844, and died, April 23, 1914, in his seventieth year.

His parents were Charles Gideon Putnam and Elizabeth Cabot (Jackson) Putnam. His paternal grandfather was Samuel Putnam of Salem, a well-known and honored member of the Massachusetts Bar and for a long time a Justice of the Supreme Court of Massachusetts. His maternal grandfather was Dr. James Jackson, of Boston,

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6 For further details regarding Mr. Pringle's life, see the biographical sketches by Dr. Ezra Brainerd, Rhodora, xiii. 225–232 (1911); by C. R. Orcutt, Science, new ser. xxxiv. 176 (1911); and by Prof. George P. Burns, ibid. 750–751 (1911).

one of the first and best among the founders of modern medicine in this commonwealth, who lived long enough to see his grandchildren attain to a ripe age and to make them familiar with qualities of mind and heart which impressed them deeply. Judge Putnam's wife, Sarah Gooll, belonged to the distinguished Pickering family of Salem, while Dr. Jackson's wife was a member of the Cabot family, which was then eminent, as it has been since, for the public and private virtues of its representatives.

Dr. Putnam graduated from Harvard College in 1865, and from the Harvard Medical School in 1869. After this he studied abroad, giving special attention to the diseases of children, and in the latter part of 1871 began to devote himself to his profession in Boston. Although he always carried on a general practice, he paid especial attention to pediatrics, and did some excellent pioneer work in orthopedics, then a branch of medicine that was but little known. In 1898 he was President of the American Pediatric Society. He lectured at the Harvard Medical School on the diseases of children from 1873 to 1875, and was clinical instructor in the same branch from 1875 to 1879.

So kindly was his disposition, so full was he of sympathy with others whose lot had been harder than his own, so ready to be a worker and, where need was, a fighter for the embodiment of good principles in good institutions, that he found himself,— almost of necessity, and from the very outset,— plunging more and more deeply into social work.

The history of his private life and medical labors need not be recorded here. It is enough to say that it was made up of a never-ending series of acts of untiring devotion, prompted by the warmest of feelings and the highest sense of duty.

As for his social service work, this was described so well by his relative Mr. Joseph Lee, in a paper first published in the Boston Med. and Surg. Journal for May 7, 1914, that I will complete this brief record by the following quotations from that source:

"Dr. Putnam had been since the beginning of his practice of medicine a leader in charitable and social work,— almost from the beginning the most important leader of such work in Boston, the first to take hold and the last to let go of each new and important enterprise.

Dr. Putnam was one of the founders, in 1873, of the little-known but extremely important Boston Society for the Relief of Destitute Mothers and Infants, which was a pioneer in establishing the policy of keeping mother and child together, and was president of the society

from 1904 until his death. In 1875 he became physician to the Massachusetts Infant Asylum, and from 1898 to 1910 he was also president of the board of trustees. The ordinary death-rate in such institutions was at that time something over ninety per cent a year. The Massachusetts Infant Asylum had already brought the rate down to less than a quarter of that figure when Dr. Putnam became connected with it, and he by his skill and devotion again reduced it by two-thirds or more. He was one of those who in 1879 took part in the movement for establishing the Associated Charities, the second charity organization society in this country; and he was always one of the sustaining members of that society in the real, not the conventional, sense, working in many capacities, as president of a conference, as director, as chairman of many committees, including the present important one on inebriety, and, since 1907, as president.

From 1892 to 1897 Dr. Putnam took a leading part in the very important movement for the reorganization of the Boston Institutions for the care of prisoners, of the poor, and of poor, neglected, and delinquent children, being on the special committee appointed by Mayor Matthews in 1892, chairman of the board of visitors of 1893–94, chairman of the standing committee on pauper institutions of the advisory board appointed by Mayor Quincy in 1896, a steady fighter for the reorganization bill of 1897. When the new system of separate unpaid boards of trustees was established he was appointed a member of the Board of Children's Institutions, and was its chairman from 1902 to 1911, performing in that capacity a great and harassing, though invisible and unappreciated, service to his fellow-citizens.

* * * * * * * * *

He was active in the campaign against tuberculosis and a director of the Mental Hygiene Association. He was one of the first to take up broad social questions from the legislative end, was the first experienced charity worker to enlist in the Massachusetts Civic League, and helped secure the establishment of the State Board of Insanity.

* * * * * * * * * * *

Dr. Putnam was for a generation the backbone of social work in Boston. We have all looked to him to do the hard things,— to take up the new line at which the timid balked and which the unimaginative could not see, sustaining the old from which the glamor had worn off, stiffening up the weak places, making the hard decisions. He was here, as in all things, a man to accept responsibility, take the burden

on himself, and carry it,— a patient and successful physician to the community as well as to the child.

Dr. Putnam's most distinctive characteristic was the power of enlistment. In each of the many services he undertook it seemed to those he served and to his fellow workers as if that must be the only thing he had to do. There are in every enterprise the helpful men, the wise, the brilliant men, the steady workers. And then there are the essential men, those without whom the thing will not be done. In an extraordinary number of instances Dr. Putnam was among these last. Whatever happened, however badly things might go, whoever else became lukewarm or discouraged, his associates knew that he, at least, would see the thing through, that he had enlisted for the war, intended doing as much, be it more or less, as might be necessary.

* * * * * * * * * *

Dr. Putnam was a remarkably resourceful man and would reconstruct his patient's world, physically as well as morally, by his calm assumption that anything needed could be done, and in hundreds of cases by doing the most impossible parts himself. Slower minds thought him slow at laying the first brick, whereas he had completed the whole structure in imagination, and was hesitating what kind of chimney-pot to use.

* * * * * * * * * *

And the best was the power behind it all in the great kind heart, that would see and know only the best, and, with a quality like the sun, could see only light wherever it was turned."

Dr. Putnam's wife, Lucy Washburn, and three children, Charles Washburn, Tracy Jackson, and Martha, survive him.

J. J. Putnam.

FREDERIC WARD PUTNAM (1839–1915)

Fellow in Class III, Section 2, 1865.

Frederic Ward Putnam, the son of Ebenezer and Elizabeth (Appleton) Putnam was born in Salem, Massachusetts, April 16, 1839, and died in Cambridge, August 14, 1915. Although his father, grandfather and great-grandfather were all graduates of Harvard College, he planned to take up a military career, having been promised an appointment at West Point. Through the influence of Louis Agassiz, however, his attention was turned toward the study of Natural History, and he accordingly entered the Lawrence Scientific School in 1856, graduating in the class of 1862.

For some years he devoted himself to work in Natural History. In 1875, however, he was made Curator of the Peabody Museum of American Archaeology and Ethnology at Harvard University, and from that time on, his main energies and interests were centered on archaeology and anthropology. He applied himself to the building up of the museum collections by explorations in the field; to the training and teaching of investigators and students; and to the establishment and development of anthropological institutions throughout the country. His great services in all of these lines have led to his being regarded as one of the founders of anthropology in America.

The professional and honorary positions held by Professor Putnam have been as follows: — Curator of Ornithology, Essex Institute, Salem, 1856–64; Assistant to Professor Louis Agassiz, Harvard University, 1857–64; Curator of Vertebrates, Essex Institute, Salem, 1864–66; Superintendent, Museum of the Essex Institute, 1866–71; Superintendent, Museum of the East Indian Marine Society, Salem, 1867–69; Director, Museum of the Peabody Academy of Science, Salem, 1869–73; Curator of Icthyology, Boston Society of Natural History, 1859–68; Permanent Secretary, American Association for the Advancement of Science, 1873–98; Assistant, Kentucky Geological Survey, 1874; Instructor, Penikese School of Natural History, 1874; Assistant, United States Engineers in Surveys West of the 100° Meridian, 1876–79; Assistant in Icthyology, Museum of Comparative Zoology, 1876–78; Curator of the Peabody Museum of American Archaeology and Ethnology, 1875–1909; Honorary Curator, 1909; Honorary Director, 1909–1915; Peabody Professor of American

Archaeology and Ethnology, Harvard University, 1886–1909; Emeritus; 1909–1915; State Commissioner of Fish and Game, Massachusetts, 1882–1889; Chief, Department of Ethnology, World's Columbian Exposition, 1891–1894; Curator of Anthropology, American Museum of Natural History, New York, 1894–1903; Professor of Anthropology and Director of the Anthropological Museum of the University of California, 1903–1909; Emeritus, 1909.

Vice-President, Essex Institute, 1871–94; Boston Society of Natural History, 1880–87, and President, 1887–89; President, American Folklore Society, 1891; of the Boston Branch of the Society, 1890–1915; President, American Association for the Advancement of Science, 1898; Vice-President, Numismatic and Antiquarian Society of Philadelphia, 1896–1915; Vice-President for the United States, International Congress of Americanists, New York 1902; Chairman, Division of Anthropology of the International Congress of Arts and Sciences, St. Louis, 1904; President, American Anthropological Association, 1905–6.

Professor Putnam received the following honorary degrees; — from Williams College, 1868, A.M.; University of Pennsylvania, 1894, S.D. From the French Government he received the Cross of the Legion of Honor in 1896.

R. B. Dixon.

FERDINAND, FREIHERR VON RICHTHOFEN (1833–1905)

Foreign Honorary Member in Class II, Section 1, 1901.

Ferdinand, Freiherr von Richthofen, Professor of Physical Geography in the University of Berlin, and eminent both as a geologist and geographer, died on October 6, 1905, in his 73d year. He was best known for his researches in China, and especially for his solution of the problem of the origin of loess.

Baron von Richthofen was born of a distinguished Silesian family at Karlsruhe on May 5, 1833. His early education was received in his native town and later in Breslau where he first studied geology. Two years of university studies in Breslau did not greatly interest him, so in 1852 he went to Berlin where he came in contact with Beyrich and with Karl Ritter. While at the University, working

under the inspiration of Ritter, he became acquainted with a man who had travelled in the Orient and thus attained his first interest in that portion of the world in which he travelled later. Von Richthofen's thesis for the doctorate was entitled "Ueber den Melaphyr," and was published in 1856. From this time until 1860 he was engaged in geological surveys in southern Tyrol and in the Carpathian Mountains. His writings during this period dealt principally with the dolomites of the Tyrol, which he concluded were formed as coral reefs, and with precious metal deposits associated with Carpathian volcanics.

In 1860, with the rank of a Legation secretary, he joined a Prussian expedition under the leadership of Count Eulenburg, to visit Siam, China, and Japan. He left the expedition in Siam and proceeded to Ceylon where he showed that laterite could be derived from the decomposition of many kinds of rocks. His travels took him to Java, the Celebes, the Philippines, Formosa, Japan, China, and Burma, and in 1862 he went to California. Six years were spent in California and Nevada, the results of the work being his memoirs on the Comstock Lode (1866) and his "Natural System of Volcanic Rocks" (1868).

The next four years were spent in the exploration of China, gathering material for his monumental work, "China." He discovered the vast coal fields of Shantung, thereby emphasizing the economic importance of China, and he advised his government to select Kiao Chau as a naval base for the Far East. In 1872 he returned to Germany to work up the results of his travels, and three years later the University of Bonn elected him to the chair of geography, but permitted him to complete the first part of the work on China before assuming his professorship in 1879. From Bonn he went to Leipzig in 1883, and to Berlin in 1886. At the University of Berlin he taught until the end of his life.

Richthofen's greatest work, "China," appeared in five volumes, the first being issued in 1877, the last in 1912. In the first volume there is an elaborate history of China and a statement of his evidence concerning the origin of loess. He held that loess was an eolian deposit formed on broad, open steppes, contrary to the belief of Pumpelly that the loess of Mongolia was deposited in lakes. These conclusions have since been confirmed by the discovery of similar deposits of loess in Central Europe, Germany, and the Mississippi Valley, associated with a steppe fauna. In 1907 Richthofen's "Tagebücher aus China," in two volumes, was published.

Petrology was the branch of geology in which von Richthofen was first interested, and in his work on melaphyre he endeavored to systematize the science by adapting a classification of rock-species in a scheme similar to that used in systematic zoology. His complete classification was published in his "Natural System of Volcanic Rocks." The faults of his plan to separate similar rocks because of different ages reflect on the conceptions of geology in Germany at the time rather than on his appreciation of the facts.

Two other works deserve mention: his "Führer für Forschungsreisende" (1886), and his "Geognostische Beschreibung von Predazzo" (1860). In the former he emphasized the desirability of precision in geographical description; in the latter he maintained that the dolomites of the South Tyrol were coral reef deposits and that the associated beds were contemporary deep-sea or coral-sand deposits. He re-asserted his conclusions in 1874, after a study of living Malaysian reefs.

SIDNEY POWERS, at the request of R. A. DALY.

SIR HENRY ROSCOE (1833–1915)

Foreign Honorary Member in Class I, Section 3, 1890.

The Rt. Hon. Sir Henry Enfield Roscoe died suddenly at his residence near London December 18th, 1915. Born January 7th, 1833, he had nearly completed his 83rd year. Up to within an hour of his death he was in good health and spirits. Then "heart failure" put an end to his interesting and useful life.

He was sent to University College, London, in 1848. Graham was then the professor of chemistry there, and he was succeeded by Williamson during Roscoe's student years. After receiving the degree of B. A. from the University of London he went to Heidelberg to continue his studies under Bunsen. Here he took part in the well-known researches on the chemical action of light. He continued work in this field for some years after receiving the degree of Doctor of Philosophy from Heidelberg in 1854, returning to Heidelberg in the summer vacations for this purpose. In Ostwald's reprint in his *Collection of Scientific Classics*, he says: "The Photochemical Re-

searches of Bunsen and Roscoe deserve the name of a classical investigation as they not only have gathered together all points known hitherto on the subject, but by their wide and thorough experiments have laid the foundation for all future work on the subject. It cannot be doubted that these researches not only serve as a classical, but as *the* classical type for all future works on the subject of physical chemistry.

Roscoe's residence in Heidelberg and his association with Bunsen and with Kirchhoff naturally led him to take special interest in spectrum analysis. He translated the book of Bunsen and Kirchhoff and also lectured extensively on this subject.

In 1857 he was elected professor of chemistry in Owens College, Manchester, succeeding Franklin. The College had then been in existence only six years, and it was in a low state financially. In his "Life and Experiences," published in 1906, he says: "The institution was at that time nearly in a state of collapse, and this fact had impressed itself even on the professors. I was standing one evening preparing myself for my lecture by smoking a cigar at the back gate of the building, when a tramp accosted me and asked me if this was the Manchester Night Asylum. I replied that it was not, but that if he would call again in six months he might find lodging there! That this opinion as to the future of the college was also generally prevalent is shown by the fact that the tenancy of a house in Dover Street was actually refused to me when the landlord learned that I was a professor in that institution."

Roscoe's principal work for chemistry was done while holding the professorship in Owens College, which he resigned in 1885 to enter Parliament, after a continuous service of 28 years. During this period the college was completely transformed and in 1880 a Royal Charter constituting the Victoria University was granted. Of this new university Owens College was a part, the other parts being the University College of Liverpool and the Yorkshire College of Leeds.

Roscoe undoubtedly rendered his country a great service in improving the methods of teaching chemistry. In this work he was ably seconded by Carl Schorlemmer, a German, who was thoroughly imbued with the spirit of the German universities. He held the chair of Organic Chemistry and distinguished himself by his researches and by his literary work. Roscoe had great admiration for the German methods and he did what he could to give his country the benefit of these methods.

Roscoe's contributions to chemistry are not numerous. Probably

the most important is that on vanadium. He says: "This is certainly the best piece of work I ever did and I do not know that I ever enjoyed anything of an intellectual kind more thoroughly." * * * "The subject aroused very general attention throughout the scientific world, and my view concerning the relationships of the metal was universally adopted."

His "Lessons in Elementary Chemistry" was published in 1866. Up to 1906 the number of copies sold was 211,000. Translations appeared in German, Russian, Italian, Hungarian, Polish, Swedish, Japanese, and even in one of the Indian vernaculars, Urdn. His primer also had a wide sale. The well-known "Treatise on Chemistry" by Roscoe and Schorlemmer is unquestionably the best English treatise on chemistry and certainly one of the best in any language.

Roscoe was elected to Parliament in 1885 and then resigned his professorship. Since that time his activities have not been displayed especially in the field of Chemistry. He continued, however, to exert a strong influence upon educational matters. After his retirement from Parliament he and his wife lived in what he called "the most beautiful and healthy spot in the whole of Surrey, namely, at Woodcote Lodge." It was here that his life ended suddenly and ideally.

IRA REMSEN.

HENRY CLIFTON SORBY (1826-1908)

Foreign Honorary Member in Class II, Section 1, 1892.

Henry Clifton Sorby, who, in an address sent him in 1907 by many leading petrographers, was called "The Father of Microscopical Petrography" was born in 1826 and died in 1908 in his eighty-second year. From the age of 20 his long life was devoted to scientific research, mainly in geology, petrography and mineralogy, unhampered by any professional duties and assisted by a moderate but sufficient competence. He prepared in 1849 what was probably the first transparent microscopic section of a rock, and in 1850 his first paper illustrating the new method by the study of sedimentary rocks was published. This attracted little attention, and it was eight years later that the classic memoir on which his fame as a pioneer principally

rests was published in the Quarterly Journal Geological Society for 1858 (read Dec. 1857) under the title: "On the Microscopical Structure of Crystals, indicating the Origin of Mineral sand Rocks" — a memoir which "though neglected, and even ridiculed at the time, laid the foundations of microscopical petrography — and, in doing so, widened enormously the sphere of influence of mineralogy from which it borrowed so much."

In the introduction the author summarizes his paper as an attempt to prove that artificial and natural crystalline substances possess microscopic characteristics by which their origin from either aqueous solution or igneous melt can be deduced, and in some cases an approximation made to their rate of formation and to the accompanying temperature and pressure. The 47 pages of the memoir contain detailed descriptions of many microscopic preparations, illustrated by drawings, an account of the methods of preparation, and a discussion of the theoretical application.

The further development of the new method was at first by German mineralogists, beginning with Dr. Ferdinand Zirkel, with whom Sorby had travelled in 1862 soon becoming an enthusiastic disciple. Zirkel's "Mikroskopische Gesteinstudie" (1863) brought the subject into wide notice and its further development was rapid.

Thus, while Dr. Sorby gave the start to the new science, he left its further development to others, devoting himself to many other problems of geological science, and to other sciences, so that almost 250 papers represented his scientific activity, as continued over sixty years, and until his death. He was elected Foreign Honorary Member of this Academy in 1892.

A detailed account of his life and activities has been given by the late Professor J. W. Judd in the Geological Magazine for 1908 and in the Mineralogical Magazine for the same year, from which the present memoir is mainly an abstract.

JOHN E. WOLFF.

EDUARD STRASBURGER (1844–1912)

Foreign Honorary Member in Class II, Section 2, 1892.

Eduard Strasburger was born in Warsaw in 1844. In 1862–1864 he studied at the Sorbonne. He then went to Bonn, where he studied under the direction of Hermann Schacht, from whom he acquired the great manual dexterity which was necessary for the preparation of microscopical specimens before the era of the microtome. In Bonn he came under the influence of the great teacher Sachs. Subsequently he studied under N. Pringsheim at Jena and received the Doctor's degree in 1866. In 1868 he began his career as a teacher at the University of Warsaw. In the following year he was called to Jena, as extraordinarius, largely through the influence of Haeckel, of whom he was an enthusiastic follower. In 1871 he became ordinarius at Jena. In Jena he married Alexandrine Wertheim of Warsaw. Here were born his two children, a daughter and a son. In 1880 he accepted a call to Bonn, where he remained until his death in May, 1912.

Strasburger had to an unusual degree the power to arouse and inspire his pupils. As a rule his laboratory had a large quota of students, of whom the majority were foreigners. His custom was to visit each student on his way to the morning lecture and it was astonishing to see how quickly he would grasp each new situation and with a few words outline the next step to be taken. His suggestions and his example never failed to stimulate the student to do his best. His insight into character and his remarkable tact accounted in no small measure for his influence upon his pupils.

His command of technique was unrivalled. He originated a large number of the methods used in cytology. When he began his work such methods were almost unknown: indeed it is commonly stated that he was the first to use material fixed and hardened in alcohol. To the very end of his life he was busily engaged in improving cytological methods. His Botanisches Practicum is a veritable encyclopaedia of technique and will always remain a model of its kind.

It must not be supposed, however, that his skill in technique was his principal asset. He had a keen analytical mind which delighted in profound generalizations. He became interested in nearly all the great botanical problems of his day and to most of them he made contributions of lasting value. He followed with remarkable eager-

ness and enthusiasm the progress of discovery in other branches of science and from them he gleaned materials for the enrichment of his own field of labor. His writing was characterized by a lucid and attractive style and he was a lecturer of unusual skill.

Owing to the great variety of subjects which he investigated it is quite impossible to give in a few words an adequate summary of his contributions. They have to do in the main with the fundamentals of morphology and especially with cytology. Beginning with the great problem of homologizing the reproductive structures of phanerogams and cryptogams, he soon became deeply interested in the finer details of the mechanism of heredity; he investigated most thoroughly the structure and behavior of the chromosomes, and this led eventually to the study of a great variety of problems in the morphology and physiology of the cell. His contributions in this field are classical and constitute a large part of the foundation of our present conception of the cell and of the mechanism of heredity.

W. J. V. OSTERHOUT.

CHARLES HALLET WING (1836–1915)

Fellow in Class I, Section 3, 1874.

Charles Hallet Wing, son of Benjamin Franklin and Adeline (Hallet) Wing, was born in Boston, August 5, 1836, and died suddenly at his home in Boston on September 13, 1915. He was a graduate of the Lawrence Scientific School of Harvard, and later was appointed Professor of Chemistry at Cornell University in 1870, resigning that position in 1874 to accept the Professorship of Analytical Chemistry at the Massachusetts Institute of Technology. Under his direction the Kidder Chemical Laboratories were planned and built, in which were introduced many new features, making them models for their time. As a teacher he demanded thoroughness, high standards of scholarship and strict attention to work, and he held the respect and confidence of his pupils.

In 1884 Professor Wing resigned his position at the Institute, and soon after took up his residence at Ledger, Mitchell Co., N. C., where

among the mountaineers he devoted his entire energies to the betterment of his neighbors. He built and furnished a school-house, and provided teachers. In connection with this building, equipment for manual training was provided, and much of the instruction in this branch was given by Professor Wing himself. He started the first free public library in North Carolina, the books for which were donated either by Professor Wing himself or through his personal solicitation.

When his physical strength began to fail he donated the school and library to the county, and returned to Boston. He was a lover of music and a student of languages, and in the society of his friends his last years were passed busily and happily.

Professor Wing was elected a Fellow of the Academy in 1874, and retained his fellowship until the time of his death.

H. P. TALBOT.

EDWARD STICKNEY WOOD (1846–1905)

Fellow in Class I, Section 3, 1879.

Edward Stickney Wood was born on April 28, 1846, and died July 11, 1905. He was the son of Alfred Wood and Laura Stickney Wood of Cambridge. After graduating from the Cambridge High School, he entered Harvard in 1863 and graduated with the class of 1867. He then entered the Harvard Medical School and completed his studies there in 1870, although he did not at that time receive his degree in medicine. After a period in the Marine Hospital in Chelsea, he entered the Massachusetts General Hospital and served there for a year as surgical house pupil. A vacancy occurring in the chemical department gave Dr. Wood his opportunity. Therefore after some time spent in Europe in the study of this branch of medical science he was appointed assistant professor and in 1876 he succeeded to the full professorship of Chemistry, which position he held until the time of his death.

His career as a teacher was attended with great success, his lectures being eminently practicable and intelligible, developing the enthusiasm which always attends the work of a popular lecturer. His judgment and advice were held in high esteem by the members of the faculty and

the President of the University. This was due to his calm and sympathetic temperament and good common-sense.

He occupied the position of leading medical expert in medico-legal cases all over New England and his record as a witness in many important trials won him universal regard in both the medical and legal profession.

Dr. Wood also found time for many articles in current medical literature, including addresses to medical bodies and participation in the discussions of the medical societies. With Robert Amory he translated the work of Neubauer and Vogel on "Urinary Analysis" and revised that portion of Wharton and Stillé on "Medical Jurisprudence" so far as his special line was concerned. In 1874 he was made a member of the commission which investigated the sanitary condition of the water of the Sudbury, Charles and other rivers. He also prepared in 1894 an important paper for the State Board of Health about "Arsenic in its relation to Domestic Life."

He was a member of the American Pharmaceutical Association, the Massachusetts Medico Legal Society, the Boston Society for Medical Improvement and the Massachusetts Medical Society. He was also a member of the committee for the revision of the "Pharmacopoeia" in 1880 and chemist to the Massachusetts General Hospital.

He was a man of the most sterling character and much beloved and respected by all who came in contact with him.

J. COLLINS WARREN.

JOHN HENRY WRIGHT (1852–1908)

Fellow in Class III, Section 2, 1893.

John Henry Wright, Professor of Greek and Dean of the Graduate School of Arts and Sciences in Harvard University, died at Cambridge, Massachusetts, Nov. 25th, 1908. He was born at Urumyat, Persia, Feb. 4, 1852, the son of Rev. Austin Hazen Wright, a missionary in Persia from 1840 to 1865. He graduated from Dartmouth College in 1873, and became Asst. Professor of Ancient Languages (Greek and Latin) at what is now Ohio State University. In 1876 he re-

ceived the degree of Master of Arts from Dartmouth, and after studying classical philology and Sanskrit at Leipzig for two years, he returned to Dartmouth as Associate Professor of Greek, a position which he held until 1886. He married, April 2, 1879, Mary, the daughter of President Eli Todd Tappan of Kenyon College. In 1886 he became Professor of Classical Philology and Dean of the Collegiate Board at Johns Hopkins University, whence he was called to Harvard in 1887. He went to Athens, Greece, as annual professor at the American School of Classical Studies in 1906–7. He became a Fellow of the American Academy of Arts and Sciences in 1893, was a member of the Council of the Archaeological Institute of America, and President of the American Philological Association in 1894. Besides being editor-in-chief of the American Journal of Archaeology from its re-organization in 1897 until 1906, he was an associate editor of the Classical Review, 1888–1906, and of its successor the Classical Quarterly from 1907. He was active in the interests of the New England Classical Association, presiding with wit and tact at its first meeting at Springfield in April, 1906.

His many monographs and contributions to classical learning cannot all be listed here, but the following are the more important works by which he made himself known to scholars the world over:

1882. An address on The Place of Original Research in Collegiate Education.
1886. The College in the University and Classical Philology in the College.
1886. Translation of Collignon's Manual of Greek Archaeology.
1892. The Date of Cylon. Although not printed until after the discovery of Aristotle's work on the Constitution of Athens, it anticipated correctly the chronology given in that work.
1893. Herondaea. Valuable studies on the newly discovered papyrus of Herondas.
1894. Studies in Sophocles.
1902. Edited "Masterpieces of Greek Literature."
1904. Present Problems of the History of Classical Literature, an address delivered at the Congress of Arts and Sciences at the St. Louis Exposition.
1905. Editor of "A History of All Nations from the Earliest times," in 24 volumes. Based in part on the Allgemeine Weltgeschichte of T. Flathe and others.
1906. The origin of Plato's cave.

In addition, his work as one of the editors of the classical section of the Twentieth Century Textbooks should be mentioned.

These brief biographical details reflect but little of the eminent personal qualities which Professor Wright possessed, but they indicate the wide variety and extent of his training and experience, and explain the beneficent influence which he exerted on so many of the younger scholars of this country. The traits that immediately impressed a student on his first meeting with him were his generosity, sympathy, and learning. His kindness was unfailing, his courtesy never shaken. Possessing a keen sense of humor, he was merciful to the blunderer, ready to overlook the crudeness and awkwardness of the tyro, but equally firm in correcting the puerile and in rebuking the insincere.

His own scholarship was fertile, whether expressed in his writings or in the work which he inspired in others. Broad in its range, it was deep in its thoroughness. Versed as he was in the technical minutiae of those branches of classical philology in which he was a specialist, he had the gift of imparting human interest and a literary quality to his exposition of scientific subjects. As a writer his style had charm, so that the study of a problem in Greek epigraphy, for example, became in his hands not only a work of scholarly importance, but also a matter of interest to a reader not trained in technicalities. He had a rare insight into the beauties of English, and his taste guided him surely in the interpretation of the subtleties and graces of Greek style. His sense of form expressed itself also in his love of Greek art, and he found congenial labor in the editorship of the Journal of Archaeology. Through his edition of Collignon's Manual and the courses which he offered in the University on the subject he became the pioneer in the teaching of classical archaeology in this country.

CHARLES BURTON GULICK.

American Academy of Arts and Sciences

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(Corrected to July 1, 1916.)

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SECTION I. — *Mathematics and Astronomy.*— 40.

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John Williams White . . . . . Cambridge
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James Ford Rhodes . . . . . Boston

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William Roscoe Thayer . . . . . Cambridge
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Thomas Franklin Waters . . . . . Ipswich
George Grafton Wilson . . . . . Cambridge
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Emil Fischer	Berlin
Fritz Haber	Berlin
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Vsevolod Jevgenjevic Timonoff . . . . . Petrograd
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SECTION I.— *Geology, Mineralogy, and Physics of the Globe.*— 6.

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Viktor Goldschmidt . . . . . Heidelberg
Julius Hann . . . . . Vienna
Albert Heim . . . . . Zürich
Johan Herman Lie Vogt . . . . . Trondhjem

CLASS II., SECTION II.— *Botany.*— 6.

John Briquet . . . . . Geneva
Adolf Engler . . . . . Berlin
Wilhelm Pfeffer . . . . . Leipsic
Hermann, Graf zu Solms-Laubach . . . . . Strassburg
Ignatz Urban . . . . . Berlin
Eugene Warming . . . . . Copenhagen

CLASS II., SECTION III.— *Zoölogy and Physiology.*— 2.

Sir Edwin Ray Lankester . . . . . London
Magnus Gustav Retzius . . . . . Stockholm

CLASS II., SECTION IV.— *Medicine and Surgery.*— 4.

Emil von Behring . . . . . Marburg
Sir Thomas Lauder Brunton, Bart . . . . . London
Angelo Celli . . . . . Rome
Adam Politzer . . . . . Vienna

Class III.— *Moral and Political Sciences.*— 24.

Section I.— *Theology, Philosophy and Jurisprudence.*— 4.

Arthur James Balfour . . . . . Prestonkirk
Heinrich Brunner . . . . . Berlin
Albert Venn Dicey . . . . . Oxford
Sir Frederick Pollock, Bart . . . . . London

Section II.— *Philology and Archæology.*— 8.

Friedrich Delitzsch . . . . . Berlin
Hermann Diels . . . . . Berlin
Wilhelm Dörpfeld . . . . . Athens
Henry Jackson . . . . . Cambridge
Hermann Georg Jacobi . . . . . Bonn
Sir Gaston Camille Charles Maspero . . . . . Paris
Alfred Percival Maudslay . . . . . Hereford
Eduard Seler . . . . . Berlin

Section III.— *Political Economy and History.*— 6.

Viscount Bryce . . . . . London
Adolf Harnack . . . . . Berlin
Alfred Marshall . . . . . Cambridge
John Morley, Viscount Morley of Blackburn . . . . . London
Sir George Otto Trevelyan, Bart . . . . . London
Pasquale Villari . . . . . Florence

Section IV.— *Literature and the Fine Arts.*— 6.

Georg Brandes . . . . . Copenhagen
Thomas Hardy . . . . . Dorchester
Jean Adrien Aubin Jules Jusserand . . . . . Paris
Rudyard Kipling . . . . . Burwash
Sir Sidney Lee . . . . . London
Sir James Augustus Henry Murray . . . . . Oxford

STATUTES AND STANDING VOTES

STATUTES

Adopted November 8, 1911: *amended May* 8, 1912, *January* 8, *and May* 14, 1913, *April* 14, 1915, *April* 12, 1916.

CHAPTER I

The Corporate Seal

Article 1. The Corporate Seal of the Academy shall be as here depicted:

Article 2. The Recording Secretary shall have the custody of the Corporate Seal.

See Chap. v. art. 3; chap. vi. art. 2.

CHAPTER II

Fellows and Foreign Honorary Members and Dues

Article 1. The Academy consists of Fellows, who are either citizens or residents of the United States of America, and Foreign Honorary Members. They are arranged in three Classes, according to the Arts and Sciences in which they are severally proficient, and each Class is divided into four Sections, namely:

Class I. *The Mathematical and Physical Sciences*
- Section 1. Mathematics and Astronomy
- Section 2. Physics
- Section 3. Chemistry
- Section 4. Technology and Engineering

Class II. *The Natural and Physiological Sciences*
- Section 1. Geology, Mineralogy, and Physics of the Globe
- Section 2. Botany
- Section 3. Zoölogy and Physiology
- Section 4. Medicine and Surgery

Class III. *The Moral and Political Sciences*
- Section 1. Theology, Philosophy, and Jurisprudence
- Section 2. Philology and Archaeology
- Section 3. Political Economy and History
- Section 4. Literature and the Fine Arts

Article 2. The number of Fellows shall not exceed Six hundred, of whom not more than Four hundred shall be residents of Massachusetts, nor shall there be more than Two hundred in any one Class.

Article 3. The number of Foreign Honorary Members shall not exceed Seventy-five. They shall be chosen from among citizens of foreign countries most eminent for their discoveries and attainments in any of the Classes above enumerated. There shall not be more than Twenty-five in any one Class.

Article 4. If any person, after being notified of his election as Fellow, shall neglect for six months to accept in writing and to pay his Admission Fee (unless he be absent from the Commonwealth at the time of his notification) his election shall be void; and if any Fellow resident within fifty miles of Boston shall neglect to pay his Annual Dues for six months after they are due, provided his attention shall have been called to this Article of the Statutes in the meantime,

he shall cease to be a Fellow; but the Council may suspend the provisions of this Article for a reasonable time.

With the previous consent of the Council, the Treasurer may dispense (*sub silentio*) with the payment of the Admission Fee or of the Annual Dues or both whenever he shall deem it advisable. In the case of officers of the Army or Navy who are out of the Commonwealth on duty, payment of the Annual Dues may be waived during such absence if continued during the whole financial year and if notification of such expected absence be sent to the Treasurer. Upon similar notification to the Treasurer, similar exemption may be accorded to Fellows subject to Annual Dues, who may temporarily remove their residence for at least two years to a place more than fifty miles from Boston.

If any person elected a Foreign Honorary Member shall neglect for six months after being notified of his election to accept in writing, his election shall be void.

See Chap. vii. art. 2.

ARTICLE 5. Every Fellow hereafter elected shall pay an Admission Fee of Ten dollars.

Every Fellow resident within fifty miles of Boston shall, and others may, pay such Annual Dues, not exceeding Fifteen dollars, as shall be voted by the Academy at each Annual Meeting, when they shall become due, except in the case of Fellows elected at the January meetings, who shall be obliged to pay but one half of such Annual Dues in the year in which they are elected; but any Fellow shall be exempt from the annual payment if, at any time after his admission, he shall pay into the treasury Two hundred dollars in addition to his previous payments.

All Commutations of the Annual Dues shall be and remain permanently funded, the interest only to be used for current expenses.

Any Fellow not previously subject to Annual Dues who takes up his residence within fifty miles of Boston, shall pay to the Treasurer within three months thereafter Annual Dues for the current year, failing which his Fellowship shall cease; but the Council may suspend the provisions of this Article for a reasonable time.

Only Fellows who pay Annual Dues or have commuted them may hold office in the Academy or serve on the Standing Committees or vote at meetings.

ARTICLE 6. Fellows who pay or have commuted the Annual Dues and Foreign Honorary Members shall be entitled to receive gratis one copy of all Publications of the Academy issued after their election.

See Chap. x. art. 2.

ARTICLE 7. Diplomas signed by the President and the Vice-President of the Class to which the member belongs, and countersigned by the Secretaries, shall be given to all the Fellows and Foreign Honorary Members.

ARTICLE 8. If, in the opinion of a majority of the entire Council, any Fellow or Foreign Honorary Member shall have rendered himself unworthy of a place in the Academy, the Council shall recommend to the Academy the termination of his membership; and if three fourths of the Fellows present, out of a total attendance of not less than fifty, at a Stated Meeting, or at a Special Meeting called for the purpose, shall adopt this recommendation, his name shall be stricken from the Roll.

See Chap. iii.; chap. vi. art. 1; chap. ix. art. 1, 7; chap. x. art. 2.

CHAPTER III

ELECTION OF FELLOWS AND FOREIGN HONORARY MEMBERS

ARTICLE 1. Elections of Fellows and Foreign Honorary Members shall be by ballot, and only at the Stated Meetings in January and May. Three fourths of the ballots cast, and not less than twenty, must be affirmative to effect an election.

ARTICLE 2. Nominations to Fellowship or Foreign Honorary Membership in any Section must be signed by two Fellows in that Section. These nominations shall be sent to the Corresponding Secretary accompanied by statements of qualifications and brief biographical data, and shall be retained by him until the first of the following October or February, as the case may be. All nominations then in his hands shall be sent in printed form to every Fellow having the right to vote, with the names of the proposers in each case, and with a request to send to the Corresponding Secretary written comments on these names not later than the fifth of November or the fifth of March respectively.

All the nominations, with the comments thereon, received up to the fifth of November or the fifth of March shall be referred at once to the appropriate Class Committees, which shall report their decisions to the Council at a special meeting to be called to consider nominations, not later than two days before the meeting of the Academy in December or April respectively.

Notice shall be sent to every Fellow having the right to vote, not later than the fifteenth of September or January, of each year, calling

attention to the fact that the limit of time for sending nominations to the Corresponding Secretary will expire on the first of the following month.

ARTICLE 3. Not later then the fourth Wednesday of December and April, the Corresponding Secretary shall send in print to every Fellow having the right to vote all nominations that have been approved by the Council, with a brief account of each nominee.

See Chap. ii.; chap. vi. art. 1; chap. ix. art. 1.

CHAPTER IV

OFFICERS

ARTICLE 1. The Officers of the Academy shall be a President (who shall be Chairman of the Council), three Vice-Presidents (one from each Class), a Corresponding Secretary (who shall be Secretary of the Council), a Recording Secretary, a Treasurer, and a Librarian, all of whom shall be elected by ballot at the Annual Meeting, and shall hold their respective offices for one year, and until others are duly chosen and installed.

There shall be also twelve Councillors, one from each Section of each Class. At each Annual Meeting three Councillors, one from each Class, shall be elected by ballot to serve for the full term of four years and until others are duly chosen and installed. The same Fellow shall not be eligible for two successive terms.

The Councillors, with the other officers previously named, and the Chairman of the House Committee, *ex officio*, shall constitute the Council.

See Chap. x. art. 1.

ARTICLE 2. If any office shall become vacant during the year, the vacancy may be filled by the Council in its discretion for the unexpired term.

ARTICLE 3. At the Stated Meeting in March, the President shall appoint a Nominating Committee of three Fellows having the right to vote, one from each Class. This Committee shall prepare a list of nominees for the several offices to be filled, and for the Standing Committees, and file it with the Recording Secretary not later than four weeks before the Annual Meeting.

See Chap. vi. art. 2.

ARTICLE 4. Independent nominations for any office, if signed by at least twenty Fellows having the right to vote, and received by the Recording Secretary not less than ten days before the Annual Meeting, shall be inserted in the call therefor, and shall be mailed to all the Fellows having the right to vote.

See Chap. vi. art. 2.

ARTICLE 5. The Recording Secretary shall prepare for use in voting at the Annual Meeting a ballot containing the names of all persons duly nominated for office.

CHAPTER V

THE PRESIDENT

ARTICLE 1. The President, or in his absence the senior Vice-President present (seniority to be determined by length of continuous fellowship in the Academy), shall preside at all meetings of the Academy. In the absence of all these officers, a Chairman of the meeting shall be chosen by ballot.

ARTICLE 2. Unless otherwise ordered, all Committees which are not elected by ballot shall be appointed by the presiding officer.

ARTICLE 3. Any deed or writing to which the Corporate Seal is to be affixed, except leases of real estate, shall be executed in the name of the Academy by the President or, in the event of his death, absence, or inability, by one of the Vice-Presidents, when thereto duly authorized.

See Chap. ii. art. 7; chap. iv. art. 1, 3; chap. vi. art. 2; chap. vii. art. 1; chap. ix. art. 6; chap. x. art. 1; 2; chap. xi. art. 1.

CHAPTER VI

THE SECRETARIES

ARTICLE 1. The Corresponding Secretary shall conduct the correspondence of the Academy and of the Council, recording or making an entry of all letters written in its name, and preserving for the files all official papers which may be received. At each meeting of the Council he shall present the communications addressed to the Academy which have been received since the previous meeting, and at the next meeting of the Academy he shall present such as the Council may determine.

He shall notify all persons who may be elected Fellows or Foreign Honorary Members, send to each a copy of the Statutes, and on their acceptance issue the proper Diploma. He shall also notify all meetings of the Council; and in case of the death, absence, or inability of the Recording Secretary he shall notify all meetings of the Academy.

Under the direction of the Council, he shall keep a List of the Fellows and Foreign Honorary Members, arranged in their several Classes and Sections. It shall be printed annually and issued as of the first day of July.

See Chap. ii. art. 7; chap. iii. art. 2, 3; chap. iv. art. 1; chap. ix. art. 6; chap. x. art. 1; chap. xi. art. 1.

ARTICLE 2. The Recording Secretary shall have the custody of the Charter, Corporate Seal, Archives, Statute-Book, Journals, and all literary papers belonging to the Academy.

Fellows borrowing such papers or documents shall receipt for them to their custodian.

The Recording Secretary shall attend the meetings of the Academy and keep a faithful record of the proceedings with the names of the Fellows present; and after each meeting is duly opened, he shall read the record of the preceding meeting.

He shall notify the meetings of the Academy to each Fellow by mail at least seven days beforehand, and in his discretion may also cause the meetings to be advertised; he shall apprise Officers and Committees of their election or appointment, and inform the Treasurer of appropriations of money voted by the Academy.

After all elections, he shall insert in the Records the names of the Fellows by whom the successful nominees were proposed.

He shall send the Report of the Nominating Committee in print to every Fellow having the right to vote at least three weeks before the Annual Meeting.

See Chap. iv. art. 3.

In the absence of the President and of the Vice-Presidents he shall, if present, call the meeting to order, and preside until a Chairman is chosen.

See Chap. i.; chap. ii. art. 7; chap. iv. art. 3, 4, 5; chap. ix. art. 6; chap. x. art. 1, 2; chap. xi. art. 1, 3.

ARTICLE 3. The Secretaries, with the Chairman of the Committee of Publication, shall have authority to publish such of the records of the meetings of the Academy as may seem to them likely to promote its interests.

CHAPTER VII

The Treasurer and the Treasury

Article 1. The Treasurer shall collect all money due or payable to the Academy, and all gifts and bequests made to it. He shall pay all bills due by the Academy, when approved by the proper officers, except those of the Treasurer's office, which may be paid without such approval; in the name of the Academy he shall sign all leases of real estate; and, with the written consent of a member of the Committee on Finance, he shall make all transfers of stocks, bonds, and other securities belonging to the Academy, all of which shall be in his official custody.

He shall keep a faithful account of all receipts and expenditures, submit his accounts annually to the Auditing Committee, and render them at the expiration of his term of office, or whenever required to do so by the Academy or the Council.

He shall keep separate accounts of the income of the Rumford Fund, and of all other special Funds, and of the appropriation thereof, and render them annually.

His accounts shall always be open to the inspection of the Council.

Article 2. He shall report annually to the Council at its March meeting on the expected income of the various Funds and from all other sources during the ensuing financial year. He shall also report the names of all Fellows who may be then delinquent in the payment of their Annual Dues.

Article 3. He shall give such security for the trust reposed in him as the Academy may require.

Article 4. With the approval of a majority of the Committee on Finance, he may appoint an Assistant Treasurer to perform his duties, for whose acts, as such assistant, he shall be responsible; or, with like approval and responsibility, he may employ any Trust Company doing business in Boston as his agent for the same purpose, the compensation of such Assistant Treasurer or agent to be fixed by the Committee on Finance and paid from the funds of the Academy.

Article 5. At the Annual Meeting he shall report in print all his official doings for the preceding year, stating the amount and condition

of all the property of the Academy entrusted to him, and the character of the investments.

ARTICLE 6. The Financial Year of the Academy shall begin with the first day of April.

ARTICLE 7. No person or committee shall incur any debt or liability in the name of the Academy, unless in accordance with a previous vote and appropriation therefor by the Academy or the Council, or sell or otherwise dispose of any property of the Academy, except cash or invested funds, without the previous consent and approval of the Council.

See Chap. ii. art. 4, 5; chap. vi. art. 2; chap ix. art. 6; chap. x. art. 1, 2, 3; chap. xi. art 1.

CHAPTER VIII

THE LIBRARIAN AND THE LIBRARY

ARTICLE 1. The Librarian shall have charge of the printed books, keep a correct catalogue thereof, and provide for their delivery from the Library.

At the Annual Meeting, as Chairman of the Committee on the Library, he shall make a Report on its condition.

ARTICLE 2. In conjunction with the Committee on the Library he shall have authority to expend such sums as may be appropriated by the Academy for the purchase of books, periodicals, etc., and for defraying other necessary expenses connected with the Library.

ARTICLE 3. All books procured from the income of the Rumford Fund or of other special Funds shall contain a book-plate expressing the fact.

ARTICLE 4. Books taken from the Library shall be receipted for to the Librarian or his assistant.

ARTICLE 5. Books shall be returned in good order, regard being had to necessary wear with good usage. If any book shall be lost or injured, the Fellow to whom it stands charged shall replace it by a new volume or by a new set, if it belongs to a set, or pay the current price thereof to the Librarian, whereupon the remainder of the set, if any,

shall be delivered to the Fellow so paying, unless such remainder be valuable by reason of association.

ARTICLE 6. All books shall be returned to the Library for examination at least one week before the Annual Meeting.

ARTICLE 7. The Librarian shall have the custody of the Publications of the Academy. With the advice and consent of the President, he may effect exchanges with other associations.

See Chap. ii. art. 6; chap. x. art. 1, 2.

CHAPTER IX

THE COUNCIL

ARTICLE 1. The Council shall exercise a discreet supervision over all nominations and elections to membership, and in general supervise all the affairs of the Academy not explicitly reserved to the Academy as a whole or entrusted by it or by the Statutes to standing or special committees.

It shall consider all nominations duly sent to it by any Class Committee, and present to the Academy for action such of these nominations as it may approve by a majority vote of the members present at a meeting, of whom not less than seven shall have voted in the affirmative.

With the consent of the Fellow interested, it shall have power to make transfers between the several Sections of the same Class, reporting its action to the Academy.

See Chap. iii. art. 2, 3; chap. x. art. 1.

ARTICLE 2. Seven members shall constitute a quorum.

ARTICLE 3. It shall establish rules and regulations for the transaction of its business, and provide all printed and engraved blanks and books of record.

ARTICLE 4. It shall act upon all resignations of officers, and all resignations and forfeitures of Fellowship; and cause the Statutes to be faithfully executed.

It shall appoint all agents and subordinates not otherwise provided for by the Statutes, prescribe their duties, and fix their compensation.

They shall hold their respective positions during the pleasure of the Council.

ARTICLE 5. It may appoint, for terms not exceeding one year, and prescribe the functions of, such committees of its number, or of the Fellows of the Academy, as it may deem expedient, to facilitate the administration of the affairs of the Academy or to promote its interests.

ARTICLE 6. At its March meeting it shall receive reports from the President, the Secretaries, the Treasurer, and the Standing Committees, on the appropriations severally needed for the ensuing financial year. At the same meeting the Treasurer shall report on the expected income of the various Funds and from all other sources during the same year.

A report from the Council shall be submitted to the Academy, for action, at the March meeting, recommending the appropriation which in the opinion of the Council should be made.

On the recommendation of the Council, special appropriations may be made at any Stated Meeting of the Academy, or at a Special Meeting called for the purpose.

See Chap. x. art. 3.

ARTICLE 7. After the death of a Fellow or Foreign Honorary Member, it shall appoint a member of the Academy to prepare a Memoir for publication in the Proceedings.

ARTICLE 8. It shall report at every meeting of the Academy such business as it may deem advisable to present.

See Chap. ii. art. 4, 5, 8; chap. iv. art. 1, 2; chap. vi. art. 1; chap. vii. art. 1; chap. xi. art. 1, 4.

CHAPTER X

STANDING COMMITTEES

ARTICLE 1. The Class Committee of each Class shall consist of the Vice-President, who shall be chairman, and the four Councillors of the Class, together with such other officer or officers annually elected as may belong to the Class. It shall consider nominations to Fellowship in its own Class, and report in writing to the Council such as may receive at a Class Committee Meeting a majority of the votes cast, provided at least three shall have been in the affirmative.

See Chap. iii. art. 2.

ARTICLE 2. At the Annual Meeting the following Standing Committees shall be elected by ballot to serve for the ensuing year:

(i) *The Committee on Finance,* to consist of three Fellows, who, through the Treasurer, shall have full control and management of the funds and trusts of the Academy, with the power of investing the funds and of changing the investments thereof in their discretion.

See Chap. iv. art. 3; chap. vii. art. 1, 4; chap. ix. art. 6.

(ii) *The Rumford Committee,* to consist of seven Fellows, who shall report to the Academy on all applications and claims for the Rumford Premium. It alone shall authorize the purchase of books publications and apparatus at the charge of the income from the Rumford Fund, and generally shall see to the proper execution of the trust.

See Chap. iv. art. 3; chap. ix. art. 6.

(iii) *The Cyrus Moors Warren Committee,* to consist of seven Fellows, who shall consider all applications for appropriations from the income of the Cyrus Moors Warren Fund, and generally shall see to the proper execution of the trust.

See Chap. iv. art. 3; chap. ix. art. 6.

(iv) *The Committee of Publication,* to consist of three Fellows, one from each Class, to whom all communications submitted to the Academy for publication shall be referred, and to whom the printing of the Proceedings and the Memoirs shall be entrusted.

It shall fix the price at which the Publications shall be sold; but Fellows may be supplied at half price with volumes which may be needed to complete their sets, but which they are not entitled to receive gratis.

Two hundred extra copies of each paper accepted for publication in the Proceedings or the Memoirs shall be placed at the disposal of the author without charge.

See Chap. iv. art. 3; chap. vi. art. 1, 3; chap. ix. art. 6.

(v) *The Committee on the Library,* to consist of the Librarian, *ex officio,* as Chairman, and three other Fellows, one from each Class, who shall examine the Library and make an annual report on its condition and management.

See Chap. iv. art. 3; chap. viii. art. 1, 2; chap. ix. art. 6.

(vi) *The House Committee*, to consist of three Fellows, who shall have charge of all expenses connected with the House, including the general expenses of the Academy not specifically assigned to the care of other Committees or Officers.

See Chap. iv. art. 1, 3; chap. ix. art. 6.

(vii) *The Committee on Meetings*, to consist of the President, the Recording Secretary, and three other Fellows, who shall have charge of plans for meetings of the Academy.

See Chap. iv. art. 3; chap. ix. art. 6.

(viii) *The Auditing Committee*, to consist of two Fellows, who shall audit the accounts of the Treasurer, with power to employ an expert and to approve his bill.

See Chap. iv. art. 3; chap. vii. art. 1; chap. ix. art. 6.

ARTICLE 3. The Standing Committees shall report annually to the Council in March on the appropriations severally needed for the ensuing financial year; and all bills incurred on account of these Committees, within the limits of the several appropriations made by the Academy, shall be approved by their respective Chairmen.

In the absence of the Chairman of any Committee, bills may be approved by any member of the Committee whom he shall designate for the purpose.

See Chap. vii. art. 1, 7; chap. ix. art. 6.

CHAPTER XI

MEETINGS, COMMUNICATIONS, AND AMENDMENTS

ARTICLE 1. There shall be annually eight Stated Meetings of the Academy, namely, on the second Wednesday of October, November, December, January, February, March, April and May. Only at these meetings, or at adjournments thereof regularly notified, or at Special Meetings called for the purpose, shall appropriations of money be made or amendments of the Statutes or Standing Votes be effected.

The Stated Meeting in May shall be the Annual Meeting of the Corporation.

Special Meetings shall be called by either of the Secretaries at the request of the President, of a Vice-President, of the Council, or of ten

Fellows having the right to vote; and notifications thereof shall state the purpose for which the meeting is called.

A meeting for receiving and discussing literary or scientific communications may be held on the fourth Wednesday of each month, excepting July, August, and September; but no business shall be transacted at said meetings.

ARTICLE 2. Twenty Fellows having the right to vote shall constitute a quorum for the transaction of business at Stated or Special Meetings. Fifteen Fellows shall be sufficient to constitute a meeting for literary or scientific communications and discussions.

ARTICLE 3. Upon the request of the presiding officer or the Recording Secretary, any motion or resolution offered at any meeting shall be submitted in writing.

ARTICLE 4. No report of any paper presented at a meeting of the Academy shall be published by any Fellow without the consent of the author; and no report shall in any case be published by any Fellow in a newspaper as an account of the proceedings of the Academy without the previous consent and approval of the Council. The Council, in its discretion, by a duly recorded vote, may delegate its authority in this regard to one or more of its members.

ARTICLE 5. No Fellow shall introduce a guest at any meeting of the Academy until after the business has been transacted, and especially until after the result of the balloting upon nominations has been declared.

ARTICLE 6. The Academy shall not express its judgment on literary or scientific memoirs or performances submitted to it, or included in its Publications.

ARTICLE 7. All proposed Amendments of the Statutes shall be referred to a committee, and on its report, at a subsequent Stated Meeting or at a Special Meeting called for the purpose, two thirds of the ballot cast, and not less than twenty, must be affirmative to effect enactment.

ARTICLE 8. Standing Votes may be passed, amended, or rescinded at a Stated Meeting, or at a Special Meeting called for the purpose, by a vote of two thirds of the members present. They may be suspended by a unanimous vote.

See Chap. ii. art. 5, 8; chap. iii.; chap. iv. art. 3, 4, 5; chap v. art. 1; chap. vi. art. 1, 2; chap. ix. art. 8.

STANDING VOTES

1. Communications of which notice has been given to either of the Secretaries shall take precedence of those not so notified.

2. Fellows may take from the Library six volumes at any one time, and may retain them for three months, and no longer. Upon special application, and for adequate reasons assigned, the Librarian may permit a larger number of volumes, not exceeding twelve, to be drawn from the Library for a limited period.

3. Works published in numbers, when unbound, shall not be taken from the Hall of the Academy without the leave of the Librarian.

4. There may be chosen by the Academy, under the same rules by which Fellows are now chosen, one hundred Resident Associates. Not more than forty Resident Associates shall be chosen in any one Class.

The election of Resident Associates shall be for a term of three years with eligibility for reëlection.

Resident Associates shall be entitled to the same privileges as Fellows, in the use of the Academy building, may attend meetings and present papers, but they shall not have the right to vote. They shall pay no Admission Fee, and their Annual Dues shall be one-half that of Fellows residing within fifty miles of Boston.

The Council and Committees of the Academy may ask one or more Resident Associates to act with them in an advisory or assistant capacity.

RUMFORD PREMIUM

In conformity with the terms of the gift of Sir Benjamin Thompson, Count Rumford, of a certain Fund to the American Academy of Arts and Sciences, and with a decree of the Supreme Judicial Court of Massachusetts for carrying into effect the general charitable intent and purpose of Count Rumford, as expressed in his letter of gift, the Academy is empowered to make from the income of the Rumford Fund, as it now exists, at any Annual Meeting, an award of a gold and a silver medal, being together of the intrinsic value of three hundred dollars,

as a Premium to the author of any important discovery or useful improvement in light or heat, which shall have been made and published by printing, or in any way made known to the public, in any part of the continent of America, or any of the American Islands; preference always being given to such discoveries as, in the opinion of the Academy, shall tend most to promote the good of mankind; and, if the Academy sees fit, to add to such medals, as a further Premium for such discovery and improvement, a sum of money not exceeding three hundred dollars.

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